Technical Service Manual

RMX™ Series

- ▲ RMX 850
- ▲ RMX 1450
- ▲ RMX 2450

QSC AUDIO

TD-000098-00
Rev. B

RMX Series
Technical Service Manual

RMX 850

RMX 1450

RMX 2450



QSC Audio Products, Inc.

Technical Services Group

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RMX Series Performance Specifications

	RMX 850	RMX 1450	RMX 2450
OUTPUT POWER ***in watts***			
FTC: 20 Hz–20 kHz @ 0.1% THD, both channels driven			
8Ω per channel	185	260	450
4Ω per channel	280	400	650
EIA: 1 kHz @ 0.1% THD, both channels driven			
8Ω per channel	200	280	500
4Ω per channel	300	450	750
1 kHz @ 1% THD, typical, both channels driven			
2Ω per channel	430	700	1200
Bridge Mono:			
8Ω, 20 Hz–20 kHz, 0.1% THD	530	800	1300
8Ω, 1 kHz, 0.1% THD	600	900	1500
4Ω, 1 kHz, 1% THD, typical	830	1400	2400
DYNAMIC HEADROOM	2 dB @ 4Ω		
DISTORTION			
SMPTE-IM	< 0.01%	< 0.01%	< 0.02%
FREQUENCY RESPONSE (at 10 dB below rated output power)	20 Hz–20 kHz, +0/-1 dB -3 dB points: 5 Hz and 50 kHz		
DAMPING FACTOR	> 300 @ 8Ω		
NOISE (unweighted 20 Hz to 20 kHz, below rated output)	100 dB	100 dB	100 dB
VOLTAGE GAIN	31.6× (30 dB)	40× (32 dB)	50× (34 dB)
INPUT SENSITIVITY, V RMS			
full rated power @ 8Ω	1.15v (+3.4 dBu)	1.15v (+3.4 dBu)	1.23v (+4.0 dBu)
INPUT IMPEDANCE	10 KΩ unbalanced 20 KΩ balanced		
CONTROLS		Front: AC switch, Ch. 1 and Ch. 2 gain	
	Rear: 10-position DIP switch		
INDICATORS	POWER: Green LED SIGNAL:	CLIP: Red LED, 1 per channel Yellow LED, 1 per channel	
CONNECTORS	Input: Active balanced; XLR and ¼" (6.3 mm) TRS, tip and pin 2 positive, and barrier strip		
Output:	"Touch-Proof" binding posts and Neutrik Speakon™		
COOLING	Continuously variable speed fan, back-to-front air flow		
AMPLIFIER PROTECTION	Full short circuit, open circuit, thermal, ultrasonic, and RF protection Stable into reactive or mismatched loads		
LOAD PROTECTION	Turn-on/turn-off muting, AC coupling, triac crowbar (on each channel)		
OUTPUT CIRCUIT TYPE	AB	AB	H
	AB: Class AB complementary linear output H: Class AB complementary linear output with Class H 2-step high efficiency circuit		
DIMENSIONS	19.0" (48.3 cm) wide, 3.5" (8.9 cm) tall (2 rack spaces) 15.9" (40 cm) deep (rack mounting to rear support ears)		
WEIGHT Shipping:	41 lb. (18.6 kg)	46 lb. (20.9 kg)	50.5 lb. (23 kg)
Net:	35 lb. (15.9 kg)	40 lb. (18.2 kg)	44.5 lb. (20.2 kg)
POWER REQUIREMENTS	Available for 120 or 220–240 VAC, 50/60 Hz		

POWER CONSUMPTION ***@ 120 VAC (both channels driven)***

Multiply currents by 0.5 for 230V units

	RMX 850 Typical[1]	RMX 850 Full[2]	RMX 850 Max[3]	RMX 1450 Typical[1]	RMX 1450 Full[2]	RMX 1450 Max[3]	RMX 2450 Typical[1]	RMX 2450 Full[2]	RMX 2450 Max[3]
Idle	0.5 A			0.5 A			0.6 A		
8Ω	3 A	4.1 A	7.4 A	3.7 A	5.4 A	10 A	4 A	9.7 A	16.4 A
4Ω	4.5 A	6.6 A	11.5 A	6 A	9.6 A	16 A	6.3 A	15.6 A	27 A
2Ω	6.5 A	9.5 A*	17 A*	9.3 A	14.7 A*	25 A*	9.2 A	23 A*	41 A*

US patents pending

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Table of Contents

1. Introduction

1.1 Service bulletins

Contact QSC Technical Services to make sure you have the most up-to-date service bulletins for RMX Series amplifiers. Service bulletins may be distributed in hard copy, via fax, and electronically (Adobe Acrobat PDF) via CD-ROMs, FTP from the QSC web site (www.qscaudio.com), and e-mail.

These service bulletins had been issued at the time this manual was printed: **RMX0001**, "Q205 Lead Stress" (RMX 2450 only); **RMX0002**, "RMX Turn-on Delay" (all RMX models); **RMX0003**, "RMX 2450 Turn-off Mute" (RMX 2450); **RMX0004**, "RMX 2450 AC Wire Routing" (RMX 2450); **RMX0005**, "RMX 2450 AC Wire Replacement" (RMX 2450); and **RMX0006**, "RMX 2450 IRFZ44N Field Effect Transistors (RMX 2450).

1.2 The well-equipped service bench

To properly service RMX amplifiers, a technician needs the right tools. The technician's service bench should have the following equipment:

- Digital multimeter with RMS AC voltage and current
- Digital clamp-on ammeter
- Dual-trace oscilloscope
- Audio distortion analyzer
- Non-inductive load resistors, configurable as 8 ohms (min. 500 watts capacity), as 4 ohms (min. 750 watts capacity), and 2 ohms (min. 1200 watts capacity)
- Variable AC voltage source, such as a Variac or Powerstat variable transformer, with a rated current capacity of up to 25A (for 120V models) or 12A (for 230V models)
- Low-distortion audio sine wave generator
- Philips and flat screwdrivers
- Soldering iron with a fine tip (25–60W recommended)
- Rosin-core solder (60/40 or 63/37)
- Long-nose pliers
- Diagonal cutters
- Wire strippers

Automated test equipment, such as an Audio Precision workstation, is very useful for servicing RMX amplifiers. Contact QSC Technical Services to obtain applicable AP test files.

1.3 Working with surface-mount components

RMX amplifiers, like many modern electronic products, use surface-mount technology (SMT) components where appropriate in order to make high-density circuitry that is reliable and economical to manufacture.

SMT components in the RMX amps are used in the small-signal and control circuits, so they do not handle significant amounts of power; therefore, they are subject to very little stress and should seldom fail. Sometimes they do fail, or they require replacement for a performance upgrade or modification. Thus, it is important to know how to work with SMT components.

Specialized tools and equipment exist for soldering, unsoldering, and removing SMT components quickly and efficiently, but they are often expensive. Most SMT repairs, though, can be handled reasonably well with common tools and equipment, such as tweezers, solder braid, and fine-tip soldering irons. The original factory components are tacked to the board with a spot of glue, so you might have to apply some force to break the adhesive.

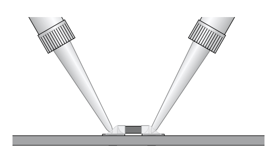


Figure 1.1.

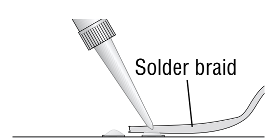


Figure 1.2.

Two-terminal components (resistors, capacitors, diodes, etc.)

Removal

1. Use two soldering irons, preferably about 25 to 40 watts, with fine tips.
2. With a soldering iron in each hand, hold one tip on the solder at one end of the component and the other tip on the other end (Figure 1.1).
3. Once the solder melts on both ends, grip the component between the two tips and lift it from the circuit board.
4. Use solder braid and a soldering iron to remove the solder from the two pads (Figure 1.2).

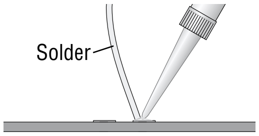


Figure 1.3.

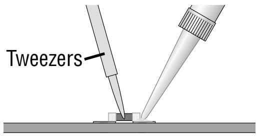


Figure 1.4.

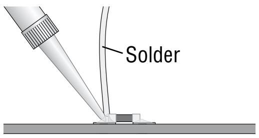


Figure 1.5.

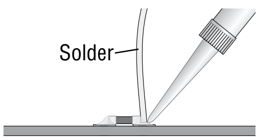


Figure 1.6.

Insertion

1. With a soldering iron and 60/40 or 63/37 eutectic-type solder, melt just enough solder onto one pad to create a small mound (Figure 1.3).
2. Grasp the component in the middle with tweezers. Melt the small mound of solder with the iron and place the component across the two pads (in the correct orientation, if the component is sensitive to direction) and press it flat against the circuit board, with one end of the component immersed in the melted solder (Figure 1.4).
3. Hold the component in place and take the soldering iron away. Let the solder harden to tack the component in place.
4. Fully solder the other end of the component to its pad. Let the solder harden (Figure 1.5).
5. Fully solder the tacked end of the component to its pad (Figure 1.6).

Three-terminal components (transistors, etc.)

Removal

1. With a soldering iron and solder braid, remove as much solder as possible from the middle terminal of the component.
2. With a soldering iron in each hand, hold one tip on the solder at the terminal at one end of the component and the other tip on the terminal at the other end.
3. When the solder on both ends melts, grip the component between the two tips and lift it from the circuit board. You might need to quickly touch the pad on the middle terminal with a soldering iron to melt any remaining solder that might be holding the component down.
4. Use solder braid and a soldering iron to remove the solder from the three pads.

Insertion

1. With a soldering iron and 60/40 or 63/37 eutectic-type solder, melt just enough solder onto one pad to create a small mound of solder.
2. Grasp the component with tweezers. Melt the small mound of solder with the iron and place the component in the correct orientation across the three pads and press it flat against the circuit board, with one terminal of the component pressed into the melted solder.
3. Hold the component in place and take the soldering iron away. Let the solder harden to tack the component in place.
4. Fully solder the other terminals of the component to their pads. Let the solder harden.
5. Fully solder the tacked terminal of the component to its pad.

Multi-pin components (ICs, etc.)

Removal

Removing a multi-pin SMT component is a delicate procedure. Ideally, you should use a soldering iron with an attachment that allows you to heat all the pins simultaneously.

If such a soldering device is not available, use this procedure:

1. Use a soldering iron and solder braid to remove as much solder as possible from the pins of the component.
2. With fine tweezers, carefully try to lift each pin to see if it's free. If it's not, touch it with the tip of the soldering iron and if necessary, use the solder braid to remove the remaining solder.
3. Repeat the process until all the pins are free and you can remove the component.

Insertion

1. With a soldering iron and 60/40 or 63/37 eutectic-type solder, melt just enough solder onto one pad to create a small mound of solder. It is usually easiest to use a pad that corresponds to one of the end or corner pins of the component.
2. Grasp the component with tweezers. Melt the small mound of solder with the iron and place the component in the correct orientation upon its pads and gently press it flat against the circuit board, with the appropriate terminal of the component pressed into the melted solder.
3. Hold the component in place and take the soldering iron away. Let the solder harden to tack the component in place.
4. Fully solder the other terminals of the component to their pads. Let the solder harden.
5. Fully solder the tacked terminal of the component to its pad.

1.4 Series description

QSC's RMX Series amplifiers are entry-level professional audio products, designed for good, basic performance and reliability at low price. The series comprises three models: the RMX 850, RMX 1450, and RMX 2450. Each one has two audio channels and is two rack spaces tall. See page 2 for complete specifications.

The RMX 850 and RMX 1450 have single-sided printed circuit boards. The RMX 2450 uses double-sided boards.

1.5 Technical descriptions and theory of operation

Note: Some of these descriptions concern circuitry that is duplicated in the amplifier's two channels. For the sake of simplicity, the descriptions are of Channel 1 only. Components in Channel 1 have a 3-digit designation with "1" as the first digit; their equivalents in Channel 2 have a "2" as the first digit, followed by the same two numerals. For example, R122 and R222 have identical functions in their respective channels.

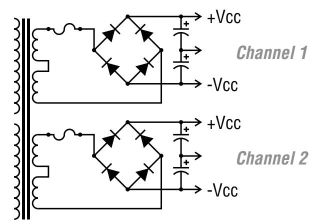


Figure 1.7

Power supplies

Unlike other recent QSC amplifiers, the RMX line uses strictly conventional power supplies, with large transformers that operate at the 50 or 60 Hz frequency of the AC line. The electrical current in the secondary circuitry is converted to DC through a full-wave bridge rectifier. The resulting 100 or 120 Hz ripple is filtered out by large capacitors that also serve as current reservoirs for short-term, transient demands.

The supply provides a bipolar set of supply rails for each channel, with equal quiescent positive and negative voltages, as shown in Figure 1.7. Note that unlike many bipolar supplies for complementary transistor arrangements, the secondary windings are not connected to ground at the center. This is because the output transistors are directly mounted to the heat sink, metal-to-metal, to maximize heat transfer; this grounds the collectors, requiring somewhat different output and power supply arrangements. The grounded-collector concept is described later in this chapter.

In the RMX 2450, the secondaries are tapped to provide an intermediate set of bipolar rails for the Class H output circuitry. Figure 1.8 shows one channel. Class H operation is described later in this chapter.

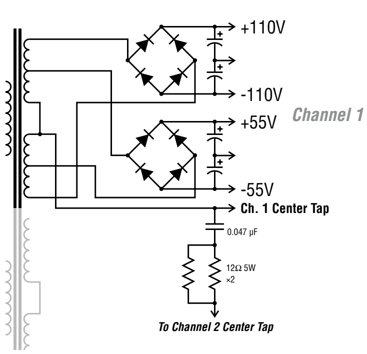


Figure 1.8

The 24-volt cooling fan is driven by a separate DC supply that is powered by a 20-volt tap on the transformer primary. To minimize fan noise, the fan speed is controlled by varying its actual DC voltage in response to the amplifier's heat sink temperatures. An optocoupler isolates the fan control circuitry from the thermal sensors.

Audio circuitry

The audio inputs are balanced to offer a reasonably high amount of common-mode noise rejection. The input balancing is done using a single op amp (one half of an NE5532 dual op amp) arranged as a differential amplifier. The degree of common-mode rejection is dependent on a close match between the input resistors (R100 and R101 in Figure 1.9) and between the feedback resistor and the shunt resistor (R105 and R106). The circuitry uses 1% precision resistors to ensure at least 40 dB of common-mode rejection.

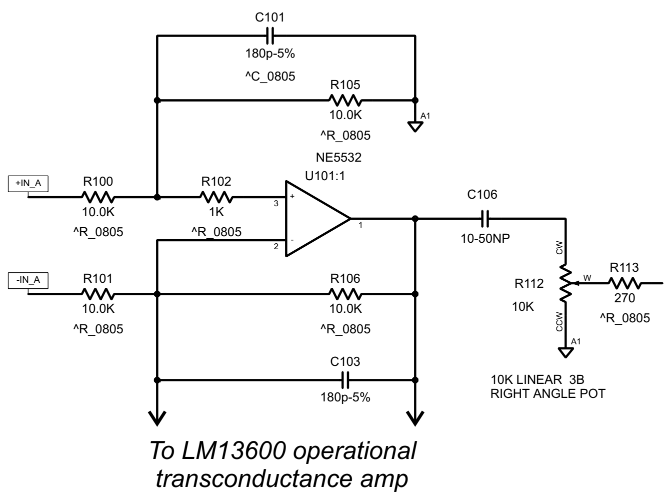


Figure 1.9

The feedback and shunt capacitors, C101 and C103, add a first-order high-frequency roll-off, down 3 dB at 88.4 kHz (over two octaves above the high end of the audio spectrum). This makes the amplifier less susceptible to RF interference, high-frequency oscillations, etc.

Also in this stage, the feedback loop contains one half of a 13600 dual operational transconductance amplifier (Figure 1.10). The OTA is part of the clip limiter circuitry; when the clip limiter is activated, a control voltage increases the transconductance of the OTA, which essentially decreases the impedance of the feedback loop and reduces the gain of the stage in order to reduce the amount of clipping.

The gain control uses a linear potentiometer, but the impedances loading the wiper to ground make the pot approximate an audio taper over most of its rotation. After the wiper, RC networks roll off the low end, if the LF filter is set for that channel, at either 30 or 50 Hz, depending on the DIP switch setting on the rear panel.

The next active device is another 5532 op amp, U101:2. Its output drives the driver transistors, which in turn drive the output transistors. The output section has a Class AB+B configuration; the drivers (a complementary pair, Q105 and Q106, comprising an NPN MJE15032 and a PNP MJE 15033) are class AB. A series network of two diodes and a 100-ohm trimpot provide the small amount of forward bias on

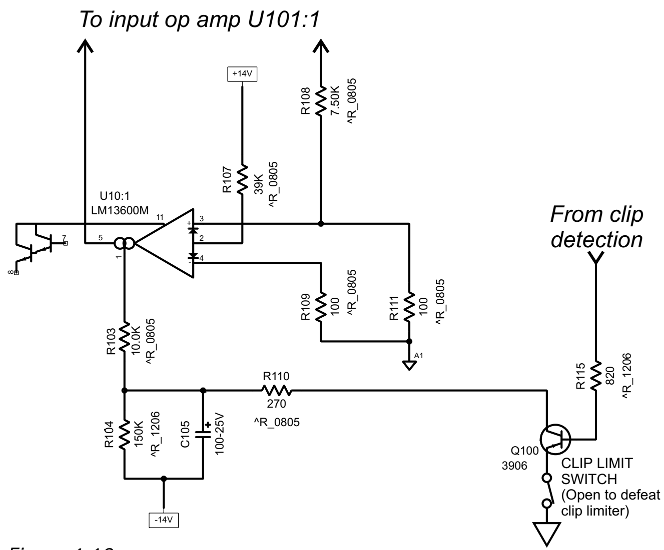


Figure 1.10

the transistor pair to keep crossover distortion minimal. In parallel with the trimpot is a 50-ohm thermistor with a negative temperature coefficient; as the circuitry warms, its resistance decreases. This reduces V_{BE} on both Q105 and Q106, decreasing the bias current to reduce the threat of thermal runaway. The base of each driver transistor is tied to ground through a diode and a 2.2K trimpot in series; these set the current limiting threshold for their respective signal polarities.

The collector of each driver transistor directly drives the bases of its output transistors, which are the main power-handling signal devices. If you're not familiar with the grounded-collector scheme, the arrangement of the output transistors might look somewhat strange: the positive voltage swings are handled by PNP transistors, while the negative swings are handled by NPN devices. The collectors all connect to ground, which allows them to be mounted directly to the heat sink—metal-to-metal, without insulators in between—for the best possible transfer of heat away from the transistors. The emitters of the PNP and NPN transistors are coupled through resistors to the positive and negative supply rails, respectively, forming banks of common-emitter circuits driving the supply rails. Consequently, the devices drive the rails with the audio signal, which rides atop the DC. The output to the speaker load is taken from the point between the positive and negative reservoir capacitors; this is also where the negative feedback is taken from. The nature of this arrangement, with audio signal riding on the supply rails, is why the power supply has no ground reference.

Another unusual characteristic of the grounded-collector output section is that the signal at the output to the speaker is actually opposite in polarity to the signal at the op amp output. This is why the negative feedback resistor, R122, connects to the op amp's non-inverting input instead of the inverting input.

The output point of the circuit couples to the output connector through an RLC network (R160, R161, R162, L100, and C124) that serves as a high-frequency snubber and also helps keep the amp circuitry stable when driving capacitive loads.

Clip detection

The output of the op amp also drives a group of four diodes (D102, D103, D105, and D106) arranged as a full-wave rectifier. Normally, the op amp's output signal level is about 1 volt or less, which is all it takes to drive the driver transistors.

But because this point is within the overall feedback loop, when clipping occurs, the op amp approcahes full open-loop gain and puts out a much higher signal voltage to try to make the output signal track the input. The four diodes rectify the voltage to drive the clip indicator LED, LD100. The current exiting the full-wave rectifier passes to ground through R127 and also drives the base of transistor Q100 through R115. If the clip limiter is switched on, Q100's emitter is grounded, and when the voltage across R127 goes sufficiently negative to forward-bias Q100, which sends current through R111 and R103 into the amplifier bias input of the operational transconductance amplifier (OTA), U10:1. The OTA is in the negative feedback loop of U101:1, and increasing its transconductance essentially reduces the impedance of the feedback loop, which reduces the gain of the op amp stage. This reduces the signal level until the amount of clipping is minimal. When the clipping stops, Q100 is no longer forward-biased, and the gain returns to normal.

DC protection

The RMX 2450 has a crowbar circuit, based on a triac and two silicon controlled rectifiers, on the output to protect against DC faults. If an amp channel puts out a DC voltage, which could be the result of a component or circuit failure, it will first trigger either D119 or D120, depending on the polarity of the voltage. The triggered SCR will in turn trigger triac Q113, shorting the output to ground through fuse F100. The fuse will blow, safeguarding the speaker load from the DC fault.

The output sections of the RMX 850 and RMX 1450 are AC coupled.

Class H

The RMX 2450 utilizes a two-step Class H output section. It is essentially a Class AB+B circuit but with two sets of bipolar supply rails. On both the positive and the negative sets of rails, a comparator circuit, called a "step driver," compares the audio signal to the lower rail voltage. When necessary to fully reproduce the signal's voltage swing—just before the signal voltage reaches the lower rail voltage—the step driver turns on a TMOS power FET to pull the output transistors' supply rail up from the lower voltage to the higher one, and then back down again when the signal allows. By keeping the transistors' supply rails low whenever possible, the devices dissipate less unused power and generate less waste heat, making the amplifier more efficient than a straight class AB amplifier with the same power points.

The comparators are 311-type ICs: U170 on the positive step and U171 on the negative. Each one drives a high-gain complementary transistor pair (2N3904 + 2N3906), which drive the gate of their respective MOSFET.

Bridged mono operation and protection

When the amplifier is operated in bridged mono, its two channels work in tandem to produce up to twice the voltage swing that a single channel is capable of. To do this, Channel 2 produces a signal identical to Channel 1's, but opposite in polarity—in other words, a mirror image.

Channel 2's signal feed (bus BR_MONO_FEED) is an attenuated version of the signal on Channel 1's speaker bus. Closing DIP switch #6 (set to "BRIDGE MONO ON"), connects the BR_MONO_FEED bus on Channel 1 to the BR_RET bus on Channel 2. The BR_RET bus drives the non-inverting input of op amp U201:2 directly.

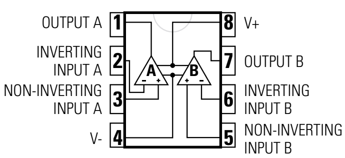
With two channels operating as one, but each having its own feedback and protection circuitry, it is vital to keep both running as mirror images. A protection circuit monitors the balance between Channel 1's and Channel 2's signals. Resistors R22 and R23 (R22A, R22B, R23A, and R23B on the RMX 2450) are equal in value and form a voltage divider between the two channel outputs. If the output signals are mirror images, the voltage at the junction of the resistors (bus BR_BAL) will be zero. If the signals are not mirror images—for example, one channel is defunct, distorting, or reduced in gain—a voltage will appear on BR_BAL. Through DIP switch 7, the BR_BAL bus becomes bus BR_CUT and feeds the bases of transistors Q8 and Q6, which are part of a 4-transistor circuit across the +15V and -15V rails that supply the op amps and the input circuitry. If the voltage on BR_CUT goes positive enough to forward-bias Q8, the transistor's collector will collapse the +15V rail. At the same time, the emitter current from Q8 will flow through R25 and into the emitter of Q7, forward-biasing it, too. The collector of Q7 will then collapse the -15V rail.

Similarly, if BR_BAL goes sufficiently negative, it will forward-bias Q6, in turn forward-biasing Q9, and these will collapse the ±15V rails.

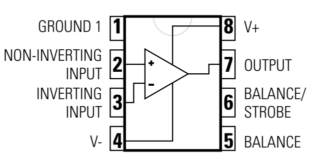
With the rails collapsed, the op amp and the input circuitry will not function, which will mute the audio.

2. Component identification and pinout

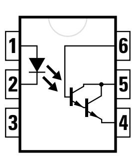
NE5532AN Dual operational amplifier



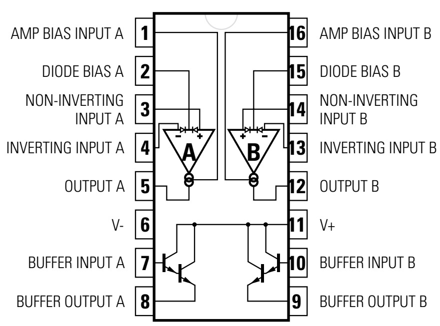
LM311 Voltage comparator



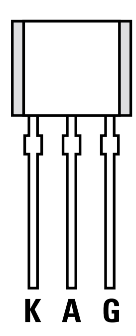
4N29 Opto-isolator



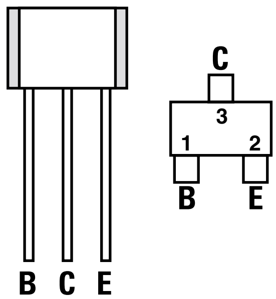
LM13600 Dual operational transconductance amplifier



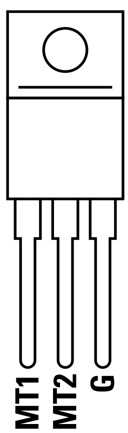
2N5064 Sensitive gate thyristor



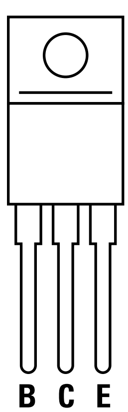
2N3904 (NPN) and 2N3906 (PNP) Small-signal transistors



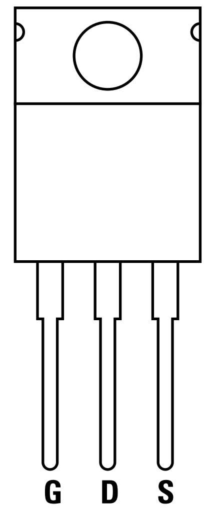
MAC224 Triac



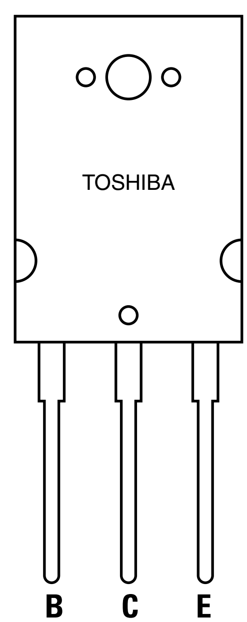
MJE15032 (NPN) and MJE15033 (PNP) Driver transistors



IRFZ44 TMOS power field effect transistor



2SC5200 (PNP) and 2SA1943 (NPN) Power transistors



3. Troubleshooting: Symptoms, causes, & remedies

When first checking the operation of an amplifier on the bench, always turn your variable transformer down to zero before plugging the amplifier in. After you turn the amplifier on, gradually turn up the AC voltage as you observe the amplifier's behavior and its current draw; this will help you determine what, if anything, is wrong with it. If you see or smell smoke, flames, or any other signs of short circuits or excessive current draw, quickly turn the AC back down to zero. If no such problems occur, it is usually safe to turn the AC up to the amplifier's full operating voltage for further testing.

3.1 Excessive current draw

The customer complains of blowing circuit breakers or fuses, or burning smell or smoke.

Symptoms covered:

- Fuses blow immediately
- The amplifier quickly gets very hot
- Line circuit breakers trip at turn-on
- The amplifier hums loudly and the chassis vibrates
- The amplifier emits smoke
- The amplifier gives off a burning smell

If the symptoms indicate a possible problem in the channel circuits or output sections, you can isolate either channel module from the power supply by pulling its fuses from the AC board.

Possible situations:

Excessive current with no signal present

If the amplifier seems to run hot and draws higher-than-normal current when idling at full AC voltage, the cause could be bias misadjustments in the output circuitry of one or both channels. See the calibration procedures in the next section. In the RMX 2450, the cause might also be blown step FETs; see service bulletin RMX0006.

Fast increase in current draw (current increases rapidly at only a few volts AC)

- The main bridge rectifiers BR100 and/or BR200 (all models) and BR101 and/or BR201 (RMX 2450) is reversed or shorted.
- Supply clamp diode pairs D117 and D118 and/or D217 and D218 is reversed or shorted.
- The drivers and/or power transistors is shorted on both polarities (NPN *and* PNP) on one or both channels.

Moderate increase in current draw (current increases slowly, doesn't become excessive until about ¼ of the amplifier's full AC operating voltage)

- One polarity's drivers and/or power transistors (NPN *or* PNP) is shorted, on one or both channels.
- Individual supply clamp diodes D117, D118, D217, or D218 is reversed or shorted.
- Bias diodes D108, D109, D208, or D209 or bias trimpots R131 or R231 is open.

Slow increase in current draw (current doesn't become excessive until about half of the amplifier's full AC operating voltage; amplifier may pass signal)

- The bias is severely misadjusted, or bias diodes D108, D109, D208, or D209 is defective.
- An oscillation is causing excessive current demand.

Runaway current draw (current increases sharply at about 25 to 33% of the amplifier's full AC operating voltage)

One or more reservoir capacitors is reversed. **CAUTION: the gas buildup in a reversed electrolytic capacitor can cause it to vent explosively.** Immediately turn off power and let the capacitor cool down before replacing it.

3.2 Protection, muting, and turn-on/turn-off delay problems

The customer complains of amplifier locking up, or not turning on and off correctly.

Symptoms covered:

- Both channels do not come out of protect
- Amplifier will not thermally shut down when it should
- Power LED doesn't light
- Too little or too much muting delay
- No clip limiting
- Fan doesn't run, or runs always at high speed

Possible situations:

Both channels stay in protect after turn-on

- Q4 or Q5 is shorted base-to-emitter.
- Voltage across D8 should be 14 to 15 volts DC. If it is low, check D8 and R10; also, C7 and C8 is leaky.
- D9, R4, and/or R7 is open.

The amplifier will not thermally shut down when it overheats

Check for shorted D9, R4, or R7; check also for open LD1 ("POWER" LED), R2, or R5.

Too much or too little muting delay

- Excessive delay at turn-on: check for open LD1, R2, or R5; check for incorrect R10 or R15; check for shorted D9; also see service bulletin RMX0002.
- Too short at turn-on (amplifier unmutes before the circuits stabilize, causing a thump): check for incorrect or bad C7, C8, or R10.
- Amplifier doesn't stay muted at turn-off: see service bulletin RMX0003

Power LED doesn't light

Check for open or shorted LD1; check R2.

No clip limiting

- U10 is defective.
- DIP switches SW1:1 or SW1:10 is defective.

Fan doesn't run

- The fan is defective.
- Check the fan connection to the AC board.
- Check R1 and BR1 on the AC board.

Fan runs always on high speed

- Q3 and/or U2 are shorted.
- Check PTC thermistors R4 and R7.

3.3 Faults with signal present

The customer compains that the amplifier passes a signal but doesn't run correctly.

Symptoms covered:

- The output signal breaks up or is distorted
- "Ringing" sound in loudspeaker when no audio signal is present
- The output signal collapses when driving a normal speaker load
- Supply rails OK with no signal, but collapse when a signal passes
- The amplifier gets too hot
- One channel clips prematurely
- Excessive hum in loudspeaker when no audio signal is present

Possible situations:

The output signal breaks up or is distorted

- (RMX 850 and RMX 1450) Check the hum-null resistors R118, R119, R218, and R219.
- Check the ground traces for continuity among speaker ground, input ground, and AC ground.

"Ringing" sound in loudspeaker when no audio signal is present

- Check C114, C124, C214 and C224.
- Check or replace dual op amp U101 or U201.

The output signal collapses when driving a normal speaker load

- R139, R140, R239, and/or R240 is misadjusted.
- Check R118, R119, R218, and R219.

The supply rails are OK with no signal but collapse with a signal

- C112, C113, C212, and/or C213 is leaky.
- Check C114, C124, C214, and C224.

The amplifier gets too hot with no load

- Bias trimpots R131 or R231 are misadjusted, burned, or open.
- Bias diodes D108, D109, D208 and/or D209 are incorrect (should be 1N4934).
- If the amplifier is producing high-frequency oscillations, check C114, C124, C214, and C224.
- Check resistors R136, R137, R236, and R237.
- Op amp U101 or U201 is unstable.

One channel clips prematurely

- R146 or R147 (Channel 1) or R246 or R247 (Channel 2) are open.
- R139 or R140 (Channel 1) or R239 or R240 (Channel 2) are misadjusted.
- Check R157, R158, R198 (RMX 2450 only), D115, and D116 (Channel 1) or R157, R258, R298 (RMX 2450 only), D215, and D216 (Channel 2).
- (RMX 850 and RMX 1450) Check R118 and R119 (Channel 1) or R218 and R219 (Channel 2).
- R130 or R132 (Channel 1) or R230 or R232 (Channel 2) is open.

Excessive hum in loudspeaker when no signal is present (RMX 850 and RMX 1450)

Check R118, R119, R218, and R219.

Excessive current draw with signal present (RMX 2450)

- Check triacs Q113 and Q213.
- Check D119, D120, D219 and D220.

3.4 Instability

The customer complains of gain problems, spurious noises, or oscillations.

Symptoms covered:

- General output distortion
- "Ringing" sound in loudspeaker trailing an audio signal
- Excessive crossover distortion
- The output waveform appears fuzzy on an oscilloscope

Distinguish among the different symptoms of fuzziness (instability), ringing (momentary instability after a transition), crossover distortion (often causing ringing), or general distortion.

Possible situations:

General distortion in the output signal

- Severe distortion, at any load, often with abnormally high current draw: check the slew rate capacitors C114, C115, and C116 (Channel 1) or C214, C215, and C216 (Channel 2).
- Moderate distortion, especially with light loading: stability capacitors C124 and C126 (Channel 1) or C224 and C226 is too high in capacitance; also check the slew rate capacitors C114, C115, and C116 (Channel 1) or C214, C215, and C216 (Channel 2), and the output filter resistors R161, R162, R154, and R155 (Channel 1) or R261, R262, R254, or R255 (Channel 2).
- Distortion with low gain: check the feedback shunt components R120, R138, and C125 (Channel 1) or R220, R238, or C225 (Channel 2); also check for broken circuit traces around the components; U101 (Channel 1) or U201 (Channel 2) is defective or its socket is contaminated.

Ringing sound trailing the audio signal

- This usually indicates marginal instability and is usually triggered by the signal passing through zero volts (the crossover point). Check the stability components and output filters.
- With a sine wave test signal, use an oscilloscope to check for excessive crossover notch at the output signal's zero crossings.

Excessive crossover distortion (unbalanced, asymmetrical, or excessively large crossover notch)

- Severe crossover discontinuity: bias diodes D108 or D109 (Channel 1) or D208 or D209 (Channel 2) are shorted.
- Moderate discontinuity: bias diodes D108 or D109 (Channel 1) or D208 or D209 (Channel 2) are out of spec.
- R131 (Channel 1) or R231 (Channel 2) is defective.
- Base resistors R136 or R137 (Channel 1) or R236 or R237 (Channel 2) are open. Also check the NTC thermistors R134 (Channel 1) or R234 (Channel 2).

3.5 Power supply & rail balancing problems

Symptoms covered:

- Insufficient or excessive current limiting into a shorted load
- Op amp rails too high with a shorted load
- Uneven voltages on supply rails

A channel's output current should remain unaffected when driving resistive loads as low as 2 ohms per channel. When driving a short circuit, the current limiting circuit should collapse the output to a lower current. This is done by dropping the op amp's supply rails from a normal ±14–15 volts down to about ±5–6 volts. Normally, the output signal helps replenish the op amp supply rails through D115 and D116 (Channel 1) and D215 and D216 (Channel 2), but a short circuit or excessively low load impedance prevents the replenishment, and the op amp rails collapse because they can't supply enough current to let the op amp drive both the clip LED and the driver transistors. The current limit trimpots R139, R140, R239, and R240 permit adjustment of the current limit thresholds. See the RMX calibration section of this manual for adjustment procedures.

Possible situations:

Excessive current into short (insufficient limiting)

- If the op amp rails are dropping to ±5 to 6 volts as they should: the 5.6V zener diodes D107 and/or D110 (Channel 1) or D207 and/or D210 (Channel 2) are reversed or shorted.
- If high crossover distortion is present: bias diodes D108 or D109 (Channel 1) or D208 or D209 (Channel 2) are shorted.

Excessive current into short (op amp rails are not dropping)

- The op amp U101 (Channel 1) or U201 (Channel 2) is defective, with insufficient output current.
- Clip LED LD100 (Channel 1) or LD200 (Channel 2) and/or its rectifying diodes (Channel 1: D102, D103, D105, D106; Channel 2: D202, D203, D205, D206) are open.
- When driving a short circuit, the output section's positive and negative supply rail voltages should be equal, within 3 volts. If they aren't, check D107, D110, R146, and R147 (Channel 1) or D207, D210, R246, and R247 (Channel 2).

Weak current into 2Ω or short (excessive or premature limiting)

- Bias resistors R130 and R132 (Channel 1) or R230 and R232 (Channel 2) are too high.
- Driver transistors (Channel 1: Q105, Q106; Channel 2: Q205, Q206) have very low gain.
- One or more emitter resistors in the output section are open.

Current OK at 2Ω, weak into short

- LD100, D102, D103, D105, or D106 (Channel 1), or LD200, D202, D203, D205, or D206 (Channel 2), are shorted.
- Zener voltage of diodes D107 or D110 (Channel 1), or D207 or D210 (Channel 2), is too high.

Current limits properly into short, but current is weak at 2Ω

- If the op amp rails are low (< 14–15 volts) when driving a 2-ohm load *without* clipping, check the resistors R157 and R158 (Channel 1, all models), R198 (Channel 1, RMX 2450 only) and diodes D115 and D116 (Channel 1, all models), or R257 and R258 (Channel 2, all models), R298 (Channel 2, RMX 2450 only) and diodes D215 and D216 (Channel 2, all models).
- If the op amp rails are normal (14–15 volts) when driving a 2-ohm load *without* clipping, usually the output section gain is too low: weak driver transistors, open output transistors, or open emitter resistors. Check the value of the driver transistors' emitter resistors, too: R146 and R147 (Channel 1) or R246 and R247 (Channel 2).

Rail voltages unequal

The balance between the positive and negative rail voltages is set by a voltage divider comprising resistors R118 and R119 (Channel 1) and R218 and R219 (Channel 2). If the amplifier channel passes a signal but clips unevenly due to unequal rail voltages, this voltage divider is the likely culprit.

4. RMX calibration procedures

4.1 Setting bias

Always set the bias

- after replacing any output or driver transistor.
- after replacing any diode or resistor in the driver/output circuitry.
- if the amplifier seems to run too hot at idle.
- if the amplifier exhibits crossover distortion.

The bias network sets the quiescent base current in the NPN and PNP driver transistors, which in turn sets the quiescent current in the output transistors. The driver transistors should both be slightly "on" at idle so that the transitions of the signal voltage between positive and negative are smooth and free of gaps or glitches. Too much bias current will cause the amplifier to run hotter than it should, especially at idle, while too little will cause noticeable crossover distortion, especially at low signal levels.

The amplifier circuitry must be cool, or at least within a couple degrees of ambient air temperature, and the top cover must be removed. If the driver and output transistors are significantly warmer than the ambient air, leave the amplifier off and let it cool before proceeding.

Before turning the amplifier on to set bias on one or both channels, familiarize yourself with the locations of the trimpots (R131 and R231) and the voltage measuring points so you can work quickly but thoroughly. If the amplifier warms up before you finish setting the

bias, you will need to shut the amplifier off and let it cool down before you resume.

Tools and resources you will need:

- Small flat screwdriver (non-conductive) for adjusting trimpots
- DC voltmeter
- AC power

Procedure

1. Turn the amplifier's gain controls all the way down. No test signal is needed.
2. Plug the amplifier into an appropriate AC source. Turn the amplifier on.
3. Channel 1: While measuring the DC voltage across resistor R146, adjust trimpot R131 to obtain the voltage listed in Table 1.
4. Channel 2: While measuring the DC voltage across resistor R246, adjust trimpot R231 to obtain the voltage listed in Table 1.

After setting the bias, calibrate the positive and negative current limiting; instructions for the procedure follow below.

4.2 Setting positive and negative current limits

Tools and resources you will need

- Oscilloscope
- 2-ohm resistive load (rated for at least 1200 watts)
- Shorting connector for amplifier output
- Variable AC transformer (e.g., Variac, Powerstat, etc.) rated for 25A (120V) or 12A (230V). Make sure the AC supply is appropriate for the amplifier.
- 1 kHz audio sine wave generator
- Digital multimeter
- Clamp-on digital current meter (e.g., Fluke 30 Clamp Meter)
- Small flat screwdriver (non-conductive) for adjusting trimpots

Procedure

1. Set the audio sine generator to 1 kHz at 1 volt RMS and connect it to Channel 1's input. Connect a 2-ohm load and the oscilloscope probe across Channel 1's output.
2. Turn up Channel 1's gain control partway. On the oscilloscope you should see the amplitude of the sine wave increase accordingly.
3. Turn the gain control back down and apply a short circuit across the output terminals of Channel 1. Clamp a current probe either onto one of the brown wires running to the AC switch or onto the gray output wire from channel 1's module.
4. Turn the gain control all the way up. Adjust trimpots R139 and R140 equally until the current measured falls within the range shown in Table 1.
5. Turn the gain control all the way down and remove the short circuit so the channel drives the 2-ohm load. Turn the gain control back up until the output clips. The voltage at which the signal starts to clip should fall within the range shown in Table 1. If the clipping is asymmetrical, that is, the signal clips on either the positive or negative side first, adjust R139 to make it symmetrical.
6. Turn the gain control down. If the amp has begun to warm up shut it off and let it cool a few minutes before proceeding with Channel 2.
7. Repeat steps 1 through 5 for Channel 2. Use trimpots R239 and R240 to adjust the current limiting in steps 11 and 12.
8. Turn both channels' gain controls all the way down. Clamp the ammeter onto one of the amp's AC wires and check the amp's idle current. If the amplifier is still at about room temperature, the idle current should match the value shown in Table 1.

Table 1: Bias and current limit adjustments

Calibrations	Adjust	RMX 850	RMX 1450	RMX 2450
Channel 1 bias: DC voltage across R146	R131	0.16 V	0.14 V	0.09 V
Channel 2 bias: DC voltage across R246	R231	0.16 V	0.14 V	0.09 V
Output current into shorted load	Channel 1: R139 & R140 Channel 2: R239 & R240	4–4.5 A	4–5 A	8–9 A
AC current when driving shorted load*	Channel 1: R139 & R140 Channel 2: R239 & R240	3.75–4.5 A	4.5–5.5 A	5–6.5 A
Clipping voltage into 2 ohms (RMS)	Channel 1: Adjust R139 for symmetry Channel 2: Adjust R239 for symmetry	26–29 V	33.5–37.5 V	44–49 V
Clipping voltage into 2 ohms (peak)	Channel 1: Adjust R139 for symmetry Channel 2: Adjust R239 for symmetry	36.8–41 V	47.4–53 V	62.2–69.3 V
Idle AC demand* (at ambient temperature; higher when hot)		0.4 A, ±10%	0.4 A, ±10%	0.5 A, ±10%

**Figures shown are for 120V amplifiers; multiply current by 0.5 for 230V.*

5. Servicing RMX amplifiers

5.1 Mechanical disassembly and re-assembly

Replacing components will usually require removing the channel modules and/or AC board from the amplifier chassis, especially on the RMX 850 and RMX 1450, which have single-side printed circuit boards. The RMX 2450 has double-side boards; many of the through-hole components on the upper side of the board can be unsoldered and soldered from the top side of the board, so removing modules or boards is not always necessary.

See the fold-out assembly guides on pages 25 and 26 in this manual for assistance.

NOTE: As viewed from the front of the amplifier, the left channel module is Channel 1 and the right is Channel 2 except *in the RMX 2450; its right module is Channel 1, and its left is Channel 2.*

Removing the channel modules

1. Disconnect the amplifier from AC power and allow at least 10 minutes for internal voltages to bleed down.

2. Using a Philips screwdriver, remove the screws that fasten the top cover to the chassis. Also remove the top cover's four recessed screws that fasten it to the heat sinks. As you remove screws, set them aside, but also make note of where each type is used so you can properly re-assemble the amplifier.

3. Lift the top cover up at the rear and carefully pull it toward the back, removing the five hooks on the front edge from their slots in the chassis.

4. Pull the gain control knobs straight off from the potentiometer shafts.

5. Tip the amplifier up on its side and remove the four screws that fasten the heat sinks to the chassis.

6. Set the amplifier back down and remove the screws that mount the channel modules to the chassis standoffs. There are six screws in the left module and five in the right one.

7. Remove the four screws that fasten the fan, fan shroud, and fan guard to the chassis. Lift the fan shroud out from the chassis; this will give you room to properly remove the modules from the chassis.

8. Disconnect the wire and cable connections to the channel modules. All of the connections are either detachable headers or ¼-inch quick-connect tabs that are disconnected by pulling them straight up. No unsoldering is necessary.

9. Slide the channel modules toward the back so the potentiometer shafts and front panel LEDs are clear of their holes in the front panel. Lift the channel modules out from the chassis.

10. Re-assembly is the opposite of disassembly.

Removing the AC board

The AC board provides AC voltage selection, rectification of the transformer secondary current, and a regulated DC supply for the cooling fan. It seldom needs to be replaced unless it is physically damaged itself. Most failures involving the AC board can be repaired through replacement of individual components.

WARNING: Regulatory agencies require that any operating voltage conversions from 120 volts to any other voltage be done *only* by QSC's factory service. Any other operating voltage conversions may be done only by a QSC-authorized service center or international distributor.

1. Disconnect the amplifier from AC power and allow at least 10 minutes for internal voltages to bleed down.

2. Remove the four screws that fasten the fan, fan shroud, and fan guard to the chassis. Lift the fan shroud out from the chassis.

3. Disconnect the wires that connect to the channel modules. All of the large single wires attach to the channel modules with ¼-inch quick-connect tabs that are detached by pulling them straight up. The remaining three black wires disconnect at the left channel module with a detachable header.

If you are planning to replace the AC board with another, carefully cut each of the transformer wires connecting to the board just above its solder tab. You must leave enough slack to allow connection to the new AC board. Remove the old heat shrink tubing from the wires and strip the wire ends about 0.25 inch or 6.3 mm.

4. Remove the five screws that attach the AC board to the chassis standoffs. Lift the board out from the chassis.

5. Re-assembly is the opposite of disassembly. If you're using a new AC board, slide new pieces of heat shrink tubing over the transformer wires before you solder them to the appropriate tabs on the board; after soldering, cover the joints with the tubing and use a heat gun or other heat source to shrink them tightly.

6. Replacement parts

6.1 RMX 850 Replacement Parts

QSC part #	Description	Qty.	Notes or Component Reference
Misc.			
1806-2505-0	POWER TRANSFORMER 700	1	
2113-1144-0	AC INLET	1	
2444-1001-1	KNOB CONTROL	2	
4134-8432-0	RACK-MOUNT BRACKET	2	
5200-4717-0	ROCKER POWER SWITCH	1	
5200-3532-0	CIRCUIT BREAKER 10A	1	For 120V models
5200-4730-0	CIRCUIT BREAKER 5A	1	For 230V models
7010-9640-0	AC CORD SET 15A	1	For 120V models
7009-8620-0	POWER CORD SET CE	1	For 230V models
8900-9050-1	DC FAN 24V 80X80 (+5V)	1	
PCB-QZ010C-PSU	**AC board**		
153R-224K-5-Y1	CM 250V 0.22uF 10% RL	2	C127, C227
157Q-108M-5-X9E	CE 35V 1000UF 20% RL	1	C6
3130-9270-0	IC 4N29	1	U2
4134-8851-0	FUSE HOLDER (DIA.6.3MM	4	REF: F100, F200
4701-202J-C	RCF 1/8W 2K 5% ATS	1	R13
4701-474J-C	RCF 1/8W 470K 5% ATS	1	R12
4701-682J-C	RCF 1/8W 6.8K 5% ATS	2	R9, R14
4719-121J-1-X	RMF 2W 120R 5% AL METAL	1	R17
4840-1760-0	DIODE RECT 1A 200V DB103	1	BR1
4840-2150-0	BRIDGE RECTIFIER 400V	2	BR100, BR200
4860-2620-5	TR TIP31C SAMSUNG	1	Q3
5100-1030-3A	FU T10A 125V/250V	2	F100, F200
5400-0831-0	HEATSINK	1	REF: Q3
8910-0273-0	POLYSWITCH 0.15 ohm 1.1A	1	R1
8910-0275-0	THERMAL NTC 30A 1 ohm	1	R21
PCB-QZ010C-PWR1	**Channel 1 module (left)**		
153F-223J-5-LQ	CM 50V 0.022UF 5% RL	2	C116, C119
153F-332J-5-KW	CM 50V 3300pF 5% RL 6x12	2	C117, C118
153R-683J-5-WWM	CM 250V 0.068u 5% RL	1	C124
157F-476M-5-LU	CE 50V 47uF 20% RL	1	C8
157R-475M-5-OV	CE 250V 4.7u 20% RL	1	C7
1804-1030-0	SPRING COIL 2uH	1	L100
3700-4531-G	LED 04mm GREEN W/STAND	1	LD1
4718-220J-2-P	RMF 1W 22R 5% AT FP	2	R136, R137
4718-6R8J-1-X	RMF 1W 6.8R 5% AL METAL	2	R146, R147
4719-153J-1-X	RMF 2W 15K 5% AL METAL	2	R2, R5
4719-5R6J-1-X	RMF 2W 5.6R 5% AL METAL	1	R160
471A-022K-5-N	RMF 3W 0.22R 10% RL RGC3	6	R142, R148, R149, R152, R153, R159
471B-120J-1-X	RMF 5W 12R 5% AL METAL	2	R161, R162
471B-202J-1-X	RMF 5W 2K 5% AL METAL	2	R133, R135
471B-821J-1-X	RMF 5W 820R 5% AL METAL	2	R157, R158
4756-1016-3-06	SVR H6 100R RH0615C	1	R131
4756-2226-3-06	SVR 2.2K H3 7X7.6 R0615C	2	R139, R140
4804-0040-1	DIODE IN4004 AL	5	D1, D11, D12, D117, D118
4804-9340-2	DIODE IN4934 AT	2	D108, D109
4837-5B10-2	DZ 1/2W 5.5-5.8V AT	2	D107, D110
4838-15V6-2	DZ 1W 15V AT TEMIC	2	D8, D15
4860-5020-5	TR MJE15032	1	Q105
4860-5030-5	TR MJE15033	1	Q106

Channel 1 module (continued)

QSC part #	Description	Qty.	Notes or Component Reference
4860-5050-5	TR 2SC5200 T0-3P (L)	3	Q108, Q110, Q112
4860-5060-5	TR 2SA1943 T0-3P (L)	3	Q103, Q107, Q109
4860-8890-0	TR MPS A06 VCE 80V NS	1	Q5
8910-0062-0	CE 80V 4700U 20% RL 25X	2	C120, C121
8910-0274-0	THERMAL PTC 60C 100 ohm	1	R7
8910-0488-0	ROD THERMISTOR NTC 50ohm	1	R134
Channel 1 SMT parts			
150F-222K-6-CF	CC 50V 2200pF 10% 1206 1	1	C115
150H-102J-6-CF	CC 100V 0.001U 5% 1206	1	C114
4720-103J-J	RMG 1/10W 10K 5% 0805	1	R128
4720-152J-J	RMG 1/10W 1.5K 5% 0805	1	R129
4720-202J-J	RMG 1/10W 2K 5% 0805	1	R8
4720-224J-J	RMG 1/10W 220K 5% 0805	1	R26
4720-470J-J	RMG 1/10W 47R 5% 0805	2	R25, R124
4721-105J-6	RMG 1/8W 1M 5% 1206	2	R3, R6
4721-154J-6	RMG 1/8W 150K 5% 1206	1	R10
4721-224J-6	RMG 1/8W 220K 5% 1206	2	R18, R27
4721-473J-6	RMG 1/8W 47K 5% 1206	1	R125
4721-474J-6	RMG 1/8W 470K 5% 1206	1	R15
4721-682J-6	RMG 1/8W 6.8K 5% 1206	1	R19
4721-821J-6	RMG 1/8W 820R 5% 1206	2	R130, R132
4804-1480-3	DIODE LL4148 SM	15	D2–D7, D9, D14, D104, D111–D116
4853-9060-3	TR 3906 PNP SM	3	Q4, Q6, Q7
4860-0640-3	TR 3904 HFE 100-300 SM	4	Q8, Q9, Q101, Q102
4860-5110-3	TR KST42	1	Q1

PCB-QZ010C-PWR2 Channel 2 module (right)

153F-154J-5-NLM	CM 50V 0.15UF 5% RL	4	C108, C109, C208, C209
153F-223J-5-LQ	CM 50V 0.022UF 5% RL	2	C216, C219
153F-224J-5-NLM	CM 50V 0.22UF 5% RL	2	C107, C207
153F-332J-5-KW	CM 50V 3300pF 5% RL 6x12	2	C217, C218
153R-683J-5-WWM	CM 250V 0.068u 5% RL	1	C224
157E-107M-5-KW	CE 25V 100uF 20% RL 6x12	2	C105, C205
157E-227M-5-PU	CE 25V 220uF 20% RL	4	C112, C113, C212, C213
157F-106M-5-LUN	CE 50V 10¦F 20% RL	2	C106, C206
1804-1030-0	SPRING COIL 2uH	1	L200
2101-1991-0	8 PIN IC SOCKET DIP	2	REF: U101, U201
3130-2430-0	IC-NE5532 OPER. AMP PHIL	2	U101, U201
3700-4529-R	LED 04mm RED W/STAND	2	LD100, LD200
3700-4530-Y	LED 04mm YELLOW W/STAND	2	LD101, LD201
471A-022K-5-N	RMF 3W 0.22R 10% RL RGC3	6	R242, R248, R249, R252, R253, R259
471B-120J-1-X	RMF 5W 12R 5% AL METAL	2	R261, R262
471B-202J-1-X	RMF 5W 2K 5% AL METAL	2	R233, R235
471B-821J-1-X	RMF 5W 820R 5% AL METAL	2	R257, R258
4717-103A-2	RMF 1/2W 10K 1% AT	2	R122, R222
4717-9091-2	RMF 1/2W 9.09K 1% AT	1	R123
4718-220J-2-P	RMF 1W 22R 5% AT FP	2	R236, R237
4750-6200-0	VR V012CPH, D-SHAFT 10K	2	R112, R212
4756-1016-3-06	SVR H6 100R RH0615C	1	R231
4756-2226-3-06	SVR 2.2K H3 7X7.6 R0615C	2	R239, R240
4718-6R8J-1-X	RMF 1W 6.8R 5% AL METAL	3	R20, R246, R247
4719-5R6J-1-X	RMF 2W 5.6R 5% AL METAL	1	R260
4804-0040-1	DIODE IN4004 AL	4	D10, D13, D217, D218
4804-9340-2	DIODE IN4934 AT	2	D208, D209
4837-5B10-2	DZ 1/2W 5.5-5.8V AT	2	D207, D210
4838-15V6-2	DZ 1W 15V AT TEMIC	4	D100, D101, D200, D201
4860-5020-5	TR MJE15032	1	Q205

Channel 2 module (continued)

QSC part #	Description	Qty.	Notes or Component Reference
4860-5030-5	TR MJE15033	1	Q206
4860-5050-5	TR 2SC5200 T0-3P (L)	3	Q208, Q210, Q212
4860-5060-5	TR 2SA1943 T0-3P (L)	3	Q203, Q207, Q209
8910-0062-0	CE 80V 4700U 20% RL 25X	2	C220, C221
8910-0274-0	THERMAL PTC 60C 100 ohm	1	R4
8910-0488-0	ROD THERMISTOR NTC 50ohm	1	R234
Channel 2 SMT parts			
150F-104K-6-CF	CER2 1206 X7R 50V 100N	3	C100, C102, C104
150F-181K-J-BD	CC 50V 180P 10% 0805	4	C101, C103, C201, C203
150F-222K-6-CF	CC 50V 2200pF 10% 1206 1	1	C215
150F-560K-J-BD	CC 50V 56pF 10% 0805 1.2	2	C110, C210
150H-102J-6-CF	CC 100V 0.001μF 5% 1206	1	C214
15CG-560J-6-CF	CTC 0/30 56P 5% 1206	2	C111, C211
3131-9730-0	IC NE5517D	1	U10
4720-101J-J	RMG 1/10W 100R 5% 0805	6	R109, R110, R127, R209, R211, R227
4720-102J-J	RMG 1/10W 1K 5% 0805	3	R102, R126, R202
4720-103A-J	RMG 1/10W 10K 1% 0805	8	R100, R101, R105, R106, R200, R201, R205, R206
4720-103J-J	RMG 1/10W 10K 5% 0805	3	R103, R203, R228
4720-152J-J	RMG 1/10W 1.5K 5% 0805	1	R229
4720-203A-J	RMG 1/10W 20K 1% 0805	4	R117, R121, R217, R221
4720-271J-J	RMG 1/10W 270R 5% 0805	6	R111, R113, R120, R210, R213, R220
4720-332J-J	RMG 1/10W 3.3K 5% 0805	1	R24
4720-393J-J	RMG 1/10W 39K 5% 0805	2	R107, R207
4720-470J-J	RMG 1/10W 47R 5% 0805	1	R224
4720-472J-J	RMG 1/10W 4.7K 5% 0805	2	R114, R214
4720-752J-J	RMG 1/10W 7.5K 5% 0805	2	R108, R208
4721-154A-6	RMG 1/8W 150K 1% 1206	4	R118, R119, R218, R219
4721-154J-6	RMG 1/8W 150K 5% 1206	2	R104, R204
4721-333J-6	RMG 1/8W 33K 5% 1206	2	R22, R23
4721-394J-6	RMG 1/8W 390K 5% 1206	2	R116, R216
4721-473J-6	RMG 1/8W 47K 5% 1206	1	R225
4721-821J-6	RMG 1/8W 820R 5% 1206	4	R115, R215, R230, R232
4804-1480-3	DIODE LL4148 SM	15	D102, D103, D105, D106, D202–D206, D211–D216
4853-9060-3	TR 3906 PNP SM	2	Q100, Q200
4860-0640-3	TR 3904 HFE 100-300 SM	2	Q201, Q202
PCB-QZ010C-INP	**Input board**		
150F-471J-5-OF	CC 50V 470pF 5% RL 8x3.5	4	C1–C4
7010-9860-0	26 PIN IEC RIBBON CABLE	1	J1
2113-1337-1	XLR FEMALE CONN.	2	J101, J201
2113-1652-0	PHONE JACK 06.4	2	J102, J202
2113-1335-0	5 POLE SPEAKER TERMINAL	1	J5
5200-4713-0	10 POLE DIP SWITCH	1	SW1
PCB-QZ010C-OUT	**Output board**		
2113-1336-1	SPEAKON NEUTRIK 4 WIRE	2	J100, J200
2113-1338-0	4-POLE SPEAKER TERMINAL	1	J103
4154-2111-0	OUTPUT POST PLUG FOR CE	2	For European models only
4154-2121-0	OUTPUT POST PLUG FOR CE	2	For European models only

6.2 RMX 1450 Replacement Parts

QSC part #	Description	Qty.	Notes or Component Reference
Misc.			
1806-2506-0	POWER TRANSFORMER, 1200	1	
2113-1144-0	AC INLET	1	
4134-9101-0	METAL WIND GUIDE	1	
4154-0361-0	FAN GUIDE	1	
5200-4717-0	ROCKER POWER SWITCH	1	
5200-3531-0	CIRCUIT BREAKER 15A	1	For 120V models
5200-4731-0	CIRCUIT BREAKER 8A	1	For 230V models
7010-9640-0	AC CORD SET 15A	1	For 120V models
7009-8620-0	POWER CORD SET CE	1	For 230V models
8900-9050-1	DC FAN 24V 80X80 (+5V)	1	
PCB-QZ020C-PSU	**AC Board**		
153R-224K-5-Y1	CM 250V 0.22uF 10% RL	2	C127, C227
157Q-108M-5-X9E	CE 35V 1000UF 20% RL	1	C6
3130-9270-0	IC 4N29	1	U2
4134-8851-0	FUSE HOLDER (DIA.6.3MM	4	REF: F100, F200
4701-202J-C	RCF 1/8W 2K 5% ATS	1	R13
4701-474J-C	RCF 1/8W 470K 5% ATS	1	R12
4701-682J-C	RCF 1/8W 6.8K 5% ATS	2	R9, R14
4719-121J-1-X	RMF 2W 120R 5% AL METAL	1	R17
4840-1760-0	DIODE RECT 1A 200V DB103	1	BR1
4840-2150-0	BRIDGE RECTIFIER 400V	2	BR100, BR200
4860-2620-5	TR TIP31C SAMSUNG	1	Q3
5120-0061-0	FUSE T12A/250V 6.3X32MM	2	F100, F200
5400-0831-0	HEATSINK	1	REF: Q3
8910-0273-0	POLYSWITCH 0.15 ohm 1.1A	1	R1
8910-0275-0	THERMAL NTC 30A 1 ohm	1	R21
PCB-QZ020C-PWR1	**Channel 1 module (left)**		
153F-223J-5-LQ	CM 50V 0.022UF 5% RL	2	C116, C119
153F-332J-5-KW	CM 50V 3300pF 5% RL 6x12	2	C117, C118
153R-683J-5-WWM	CM 250V 0.068u 5% RL	1	C124
157F-476M-5-LU	CE 50V 47uF 20% RL	1	C8
157R-475M-5-OV	CE 250V 4.7u 20% RL	1	C7
1804-1040-0	SPRNG COIL 2uH(14gaWIRE)	1	L100
3700-4531-G	LED 04mm GREEN W/STAND	1	LD1
4718-220J-2-P	RMF 1W 22R 5% AT FP	2	R136, R137
4718-6R8J-1-X	RMF 1W 6.8R 5% AL METAL	2	R146, R147
4719-153J-1-X	RMF 2W 15K 5% AL METAL	2	R2, R5
4719-5R6J-1-X	RMF 2W 5.6R 5% AL METAL	1	R160
471A-022K-5-N	RMF 3W 0.22R 10% RL RGC3	8	R142, R143, R148, R149, R152, R153, R156, R159
471B-102J-1-X	RMF 5W 1K 5% AL METAL	2	R157, R158
471B-120J-1-X	RMF 5W 12R 5% AL METAL	2	R161, R162
471B-302J-1-X	RMF 5W 3K 5% AL METAL	2	R133, R135
4756-1016-3-06	SVR H6 100R RH0615C	1	R131
4756-2226-3-06	SVR 2.2K H3 7X7.6 R0615C	2	R139, R140
4804-0040-1	DIODE IN4004 AL	5	D1, D11, D12, D117, D118
4804-9340-2	DIODE IN4934 AT	2	D108, D109
4837-5B10-2	DZ 1/2W 5.5-5.8V AT	2	D107, D110
4838-15V6-2	DZ 1W 15V AT TEMIC	D8, D15	
4860-5020-5	TR MJE15032	1	Q105
4860-5030-5	TR MJE15033	1	Q106
4860-5050-5	TR 2SC5200 T0-3P (L)	4	Q104, Q108, Q110, Q112
4860-5060-5	TR 2SA1943 T0-3P (L)	4	Q103, Q107, Q109, Q111
4860-8890-0	TR MPS A06 VCE 80V NS	1	Q5
8910-0272-0	CE 100V 3300u 20% 25X50	4	C120–C123

Channel 2 module (continued)

QSC part #	Description	Qty.	Notes or Component Reference
8910-0274-0	THERMAL PTC 60C 100 ohm	1	R7
8910-0488-0	ROD THERMISTOR NTC 50ohm	1	R134
Channel 1 SMT parts			
150F-222K-6-CF	CC 50V 2200pF 10% 1206 1	1	C115
150H-102J-6-CF	CC 100V 0.001U 5% 1206	1	C114
4720-103J-J	RMG 1/10W 10K 5% 0805	1	R128
4720-152J-J	RMG 1/10W 1.5K 5% 0805	1	R129
4720-202J-J	RMG 1/10W 2K 5% 0805	1	R8
4720-224J-J	RMG 1/10W 220K 5% 0805	1	R26
4720-470J-J	RMG 1/10W 47R 5% 0805	2	R25, R124
4721-105J-6	RMG 1/8W 1M 5% 1206	2	R3, R6
4721-154J-6	RMG 1/8W 150K 5% 1206	1	R10
4721-224J-6	RMG 1/8W 220K 5% 1206	2	R18, R27
4721-473J-6	RMG 1/8W 47K 5% 1206	1	R125
4721-474J-6	RMG 1/8W 470K 5% 1206	1	R15
4721-682J-6	RMG 1/8W 6.8K 5% 1206	1	R19
4721-821J-6	RMG 1/8W 820R 5% 1206	2	R130, R132
4804-1480-3	DIODE LL4148 SM	15	D2–D7, D9, D14, D104, D111–D116
4853-9060-3	TR 3906 PNP SM	3	Q4, Q6, Q7
4860-0640-3	TR 3904 HFE 100-300 SM	4	Q8, Q9, Q101, Q102
4860-5110-3	TR KST42	1	Q1

PCB-QZ020C-PWR2 Channel 2 module (right)

QSC part #	Description	Qty.	Notes or Component Reference
153F-154J-5-NLM	CM 50V 0.15UF 5% RL	4	C108, C109, C208, C209
153F-223J-5-LQ	CM 50V 0.022UF 5% RL	2	C216, C219
153F-224J-5-NLM	CM 50V 0.22UF 5% RL	2	C107, C207
153F-332J-5-KW	CM 50V 3300pF 5% RL 6x12	2	C217, C218
153R-683J-5-WWM	CM 250V 0.068u 5% RL	1	C224
157E-107M-5-KW	CE 25V 100uF 20% RL 6x12	2	C105, C205
157E-227M-5-PU	CE 25V 220uF 20% RL	4	C112, C113, C212, C213
157F-106M-5-LUN	CE 50V 10¦F 20% RL	2	C106, C206
1804-1040-0	SPRNG COIL 2uH(14gaWIRE)	1	L200
2101-1991-0	8 PIN IC SOCKET DIP	2	REF: U101, U201
3130-2430-0	IC-NE5532 OPER. AMP PHIL	2	U101, U201
3700-4529-R	LED 04mm RED W/STAND	2	LD100, LD200
3700-4530-Y	LED 04mm YELLOW W/STAND	2	LD101, LD201
471A-022K-5-N	RMF 3W 0.22R 10% RL RGC3	8	R242, R243, R248, R249, R252, R253, R256, R259
471B-102J-1-X	RMF 5W 1K 5% AL METAL	2	R257, R258
471B-120J-1-X	RMF 5W 12R 5% AL METAL	2	R261, R262
471B-302J-1-X	RMF 5W 3K 5% AL METAL	2	R233, R235
4717-1132-2	RMF 1/2W 11.3K 1% AT	1	R123
4717-1332-2	RMF 1/2W 13.3K 1% AT	2	R122, R222
4718-220J-2-P	RMF 1W 22R 5% AT FP	2	R236, R237
4718-6R8J-1-X	RMF 1W 6.8R 5% AL METAL	3	R20, R246, R247
4719-5R6J-1-X	RMF 2W 5.6R 5% AL METAL	1	R260
4750-6200-0	VR V012CPH, D-SHAFT 10K	2	R112, R212
4756-1016-3-06	SVR H6 100R RH0615C	1	R231
4756-2226-3-06	SVR 2.2K H3 7X7.6 R0615C	2	R239, R240
4804-0040-1	DIODE IN4004 AL	4	D10, D13, D217, D218
4804-9340-2	DIODE IN4934 AT	2	D208, D209
4837-5B10-2	DZ 1/2W 5.5-5.8V AT	2	D207, D210
4838-15V6-2	DZ 1W 15V AT TEMIC	4	D100, D101, D200, D201
4860-5020-5	TR MJE15032	1	Q205
4860-5030-5	TR MJE25033	1	Q206
4860-5050-5	TR 2SC5200 T0-3P (L)	4	Q204, Q208, Q210, Q212
4860-5060-5	TR 2SA1943 T0-3P (L)	4	Q203, Q207, Q209, Q211
8910-0272-0	CE 100V 3300u 20% 25X50	4	C220–C223

Channel 2 module (continued)

QSC part #	Description	Qty.	Notes or Component Reference
8910-0274-0	THERMAL PTC 60C 100 ohm	1	R4
8910-0488-0	ROD THERMISTOR NTC 50ohm	1	R234
Channel 2 SMT Parts			
150F-104K-6-CF	CER2 1206 X7R 50V 100N	3	C100, C102, C104
150F-181K-J-BD	CC 50V 180P 10% 0805	4	C101, C103, C201, C203
150F-222K-6-CF	CC 50V 2200pF 10% 1206 1	1	C215
150F-560K-J-BD	CC 50V 56pF 10% 0805 1.2	2	C110, C210
150H-102J-6-CF	CC 100V 0.001U 5% 1206	1	C214
15CG-560J-6-CF	CTC 0/30 56P 5% 1206	2	C111, C211
3131-9730-0	IC NE5517D	1	U10
4720-101J-J	RMG 1/10W 100R 5% 0805	6	R109, R110, R127, R209, R211, R227
4720-102J-J	RMG 1/10W 1K 5% 0805	3	R102, R126, R202
4720-103A-J	RMG 1/10W 10K 1% 0805	8	R100, R101, R105, R106, R200, R201, R205, R206
4720-103J-J	RMG 1/10W 10K 5% 0805	3	R103, R203, R228
4720-152J-J	RMG 1/10W 1.5K 5% 0805	1	R229
4720-203A-J	RMG 1/10W 20K 1% 0805	4	R117, R121, R217, R221
4720-271J-J	RMG 1/10W 270R 5% 0805	6	R111, R113, R120, R210, R213, R220
4720-332J-J	RMG 1/10W 3.3K 5% 0805	1	R24
4720-393J-J	RMG 1/10W 39K 5% 0805	2	R107, R207
4720-470J-J	RMG 1/10W 47R 5% 0805	1	R224
4720-472J-J	RMG 1/10W 4.7K 5% 0805	2	R114, R214
4720-752J-J	RMG 1/10W 7.5K 5% 0805	2	R108, R208
4721-154A-6	RMG 1/8W 150K 1% 1206	4	R118, R119, R218, R219
4721-154J-6	RMG 1/8W 150K 5% 1206	2	R104, R204
4721-333J-6	RMG 1/8W 33K 5% 1206	2	R22, R23
4721-473J-6	RMG 1/8W 47K 5% 1206	1	R225
4721-4993-6	RMG 1/8W 499K 1% 1206	2	R116, R216
4721-821J-6	RMG 1/8W 820R 5% 1206	4	R115, R215, R230, R232
4804-1480-3	DIODE LL4148 SM	15	D102, D103, D105, D106, D202–D206, D211–D216
4853-9060-3	TR 3906 PNP SM	2	Q100, Q200
4860-0640-3	TR 3904 HFE 100-300 SM	2	Q201, Q202

PCB-QZ020C-INP Input Board

QSC part #	Description	Qty.	Notes or Component Reference
150F-471J-5-OF	CC 50V 470pF 5% RL 8x3.5	4	C1, C2, C3, C4
2113-1337-1	XLR FEMALE CONN.	2	J101, J201
2113-1652-0	PHONE JACK 1/4" 6.4 mm	2	J102, J202
5200-4713-0	10 POLE DIP SWITCH	1	SW1
7010-9860-0	26 PIN IEC RIBBON CABLE	1	J1

PCB-QZ020C-OUT Output Board

QSC part #	Description	Qty.	Notes or Component Reference
2113-1336-1	SPEAKON NEUTRIK 4 WIRE	2	J100, J200
2113-1338-0	4-POLE SPEAKER TERMINAL	1	J103
4154-2111-0	OUTPUT POST PLUG FOR CE	2	For European models only
4154-2121-0	OUTPUT POST PLUG FOR CE	2	For European models only

6.3 RMX 2450 Replacement Parts

Misc.

QSC part #	Description	Qty.	Notes or Component Reference
1806-2507-0	POWER TRANSFORMER, 1800	1	
2113-1144-0	AC INLET	1	
4134-9101-0	METAL WIND GUIDE	1	
4154-0361-0	FAN GUIDE	1	
5200-4717-0	ROCKER POWER SWITCH	1	
5200-3531-0	CIRCUIT BREAKER 15A	1	For 120V models
5200-4731-0	CIRCUIT BREAKER 8A	1	For 230V models
7010-9640-0	AC CORD SET 15A	1	For 120V models
7009-8620-0	POWER CORD SET CE	1	For 230V models
8900-9050-1	DC FAN 24V 80X80 (+5V)	1	

PCB-QZ030C-PSU AC Board

QSC part #	Description	Qty.	Notes or Component Reference
4701-202J-C	RCF 1/8W 2K 5% ATS	1	R13
4701-474J-C	RCF 1/8W 470K 5% ATS	1	R12
4701-682J-C	RCF 1/8W 6.8K 5% ATS	2	R9, R14
153R-224K-5-Y1	CM 250V 0.22uF 10% RL	4	C127, C128, C227, C228
153T-473K-5-WS	CM 400V 0.047UF 10% RL	1	C10
157Q-108M-5-X9E	CE 35V 1000UF 20% RL	1	C6
3130-9270-0	IC 4N29	1	U2
4719-121J-1-X	RMF 2W 120R 5% AL METAL	1	R17
471B-120J-1-X	RMF 5W 12R 5% AL METAL	2	R28, R29
4840-1760-0	DIODE RECT 1A 200V DB103	1	BR1
4840-2150-0	BRIDGE RECTIFIER 400V	4	BR100, BR101, BR200, BR201
4860-2620-5	TR TIP31C SAMSUNG	1	Q3
5400-0831-0	HEATSINK	1	REF: Q3
5400-1831-1	HEATSINK FOR RECTIFIER	4	REF: BR100, BR101, BR200, BR201
8910-0273-0	POLYSWITCH 0.15 ohm 1.1A	1	R1
8910-0275-0	THERMAL NTC 30A 1 ohm	1	R21

PCB-QZ030C-PWR2 Channel 1 module (right)

QSC part #	Description	Qty.	Notes or Component Reference
153F-154J-5-NLM	CM 50V 0.15UF 5% RL	4	C108, C109, C208, C209
153F-223J-5-LQ	CM 50V 0.022UF 5% RL	2	C116, C119
153F-224J-5-NLM	CM 50V 0.22UF 5% RL	2	C107, C207
153F-332J-5-KW	CM 50V 3300pF 5% RL 6x12	2	C172, C179
153H-102J-5-IQ	CM 100V 0.001U 5% RL 5X	2	C131, C231
153R-104J-5-YRM	CM 250V 0.1u 5% RL	2	C174, C175
153R-152J-5-XQ	CM 250V 0.0015UF 5% RL	1	C114
153R-683J-5-WWM	CM 250V 0.068u 5% RL	2	C124, C126
157D-107M-5-OUN	CE 16V 100UF 20% RL 8X11	2	C125, C225
157D-476M-5-LUN	CE 16V 47u 20% RL 6.5X11	2	C106, C206
157E-107M-5-KW	CE 25V 100uF 20% RL 6x12	4	C105, C173, C180, C205
157E-226M-5-IUN	CE 25V 22uF 20% RL 5X11	1	C129
157E-227M-5-PU	CE 25V 220uF 20% RL	4	C112, C113, C212, C213
157Q-106M-5-IU	CE 35V 10uF 20% RL 5x11	1	C171
1804-1040-0	SPRING COIL 2uH (14gaWIRE)	1	L100
2101-1991-0	8 PIN IC SOCKET DIP	2	REF: U101, U201
2101-2081-0	26 PIN DUAL ROW IEC	1	J103
2102-130S-003	13 PIN WAFER P2.0 ST.	1	J104
3130-2430-0	IC-NE5532 OPER. AMP PHIL	2	U101, U201
3700-4529-R	LED 04mm RED W/STAND	2	LD100, LD200
3700-4530-Y	LED 04mm YELLOW W/STAND	2	LD101, LD201
4134-8851-0	FUSE HOLDER (DIA.6.3MM	2	F100
4715-100J-2	RMF 1/4W 10R 5% AT	1	R163
4715-101J-2	RMF 1/4W 100R 5% AT	1	R164
4717-2322-2	RMF 1/2W 23.2K 1% AT	3	R122, R123, R222
4718-123J-2-X	RMF 1W 12K 5% AT METAL	2	R177, R194

Channel 1 module (continued)

QSC part #	Description	Qty.	Notes or Component Reference
4718-153J-2-X	RMF 1W 15K 5% AT METAL	1	R165
4718-220J-2-P	RMF 1W 22R 5% AT FP	2	R136, R137
4718-3R3J-1-X	RMF 1W 3.3R 5% AL	3	R146, R147, R20
4719-1R5J-1-X	RMF 2W 1R5 5% AL METAL	2	R181, R182
4719-5R6J-1-X	RMF 2W 5.6R 5% AL METAL	1	R160
471A-022K-5-N	RMF 3W 0.22R 10% RL RGC3	8	R142, R143, R148, R149, R152, R153, R156, R159
471B-120J-1-X	RMF 5W 12R 5% AL METAL	4	R154, R155, R161, R162
471B-222J-1-X	RMF 5W 2.2K 5% AL METAL	3	R157, R158, R198
471B-512J-1-X	RMF 5W 5.1K 5% AL METAL	2	R180, R188
471B-822J-1-X	RMF 5W 8.2K 5% AL METAL	4	R118, R119, R133, R135
4750-6200-0	VR V012CPH, D-SHAFT 10K	2	R112, R212
4756-1016-3-06	SVR H6 100R RH0615C	1	R131
4756-2226-3-06	SVR 2.2K H3 7X7.6 R0615C	2	R139, R140
4804-0040-1	DIODE IN4004 AL	4	D10, D12, D117, D118
4804-9340-2	DIODE IN4934 AT	2	D108, D109
4837-3B20-2	DZ 1/2W 3.8-4.0V AT	1	D170
4837-5B10-2	DZ 1/2W 5.5-5.8V AT	2	D107, D110
4838-10V6-2	DZ 1.3W 10V AT TEMIC	1	D174
4838-12V6-2	DZ 1W 12V AT TEMIC	1	D178
4838-15V6-2	DZ 1W 15V AT TEMIC	4	D100, D101, D200, D201
4840-2190-0	DIODE MUR1520 15A 200V	2	D175, D176
4860-5020-5	TR MJE15032	1	Q105
4860-5030-5	TR MJE15033	1	Q106
4860-5050-5	TR 2SC5200 T0-3P (L)	4	Q104, Q108, Q110, Q112
4860-5060-5	TR 2SA1943 T0-3P (L)	4	Q103, Q107, Q109, Q111
4860-5250-5	TR 2N5064 TRIODE	2	D119, D120
490F-Z440-5	FET IRFZ44 TO-220 60V	2	Q170, Q174
5120-0501-0	FUSE T25A/125V 6.4X32MM	1	F100
8910-0274-0	THERMAL PTC 60C 100 ohm	1	R4
8910-0482-0	TRIAC 600V 40A MAC224A8	1	Q113
8910-0488-0	ROD THERMISTOR NTC 50ohm	1	R134
8910-0494-0	CE 63V 12000uF 20% RL	4	C120–C123

Channel 1 SMT parts

QSC part #	Description	Qty.	Notes or Component Reference
150F-101J-J-BD	CC 50V 100pF 5% 0805 1.2	1	C130
150F-101K-J-BD	CC 50V 100P 10% 0805	1	C132
150F-103M-J-BD	CC 50V 0.01uF 20% 0805 1	1	C181
150F-104M-6-CF	CC 50V 0.1uF 20% 1206 1.	2	C104, C178
150F-181K-J-BD	CC 50V 180P 10% 0805	4	C101, C103, C201, C203
150F-222K-6-CF	CC 50V 2200pF 10% 1206 1	1	C115
150F-470J-J-BD	CC 50V 47pF 5% 0805 1.2x	5	C110, C170, C176, C177, C210
15CG-270J-6-CF	CTC 0/30 27P 5% 1206	2	C111, C211
3130-9240-0	IC LM311M VOLTAGE	2	U170, U171
3131-9730-0	IC NE5517D	1	U10
4720-101J-J	RMG 1/10W 100R 5% 0805	6	R109, R110, R127, R209, R210, R227
4720-102J-J	RMG 1/10W 1K 5% 0805	3	R102, R126, R202
4720-103A-J	RMG 1/10W 10K 1% 0805	8	R100, R101, R105, R106, R200, R201, R205, R206
4720-103J-J	RMG 1/10W 10K 5% 0805	3	R103, R128, R203
4720-123J-J	RMG 1/10W 12K 5% 0805	1	R176
4720-152J-J	RMG 1/10W 1.5K 5% 0805	1	R129
4720-202J-J	RMG 1/10W 2K 5% 0805	2	R190, R195
4720-222J-J	RMG 1/10W 2.2K 5% 0805	1	R191
4720-243J-J	RMG 1/10W 24K 5% 0805	4	R117, R121, R217, R221
4720-271J-J	RMG 1/10W 270R 5% 0805	4	R113, R196, R213, R296
4720-3011-J	RMG 1/10W 3.01K 1% 0805	2	R24, R175
4720-391J-J	RMG 1/10W 390R 5% 0805	2	R120, R220
4720-393J-J	RMG 1/10W 39K 5% 0805	2	R107, R207
4720-470J-J	RMG 1/10W 47R 5% 0805	2	R170, R189

Channel 1 module (continued)

QSC part #	Description	Qty.	Notes or Component Reference
4720-472J-J	RMG 1/10W 4.7K 5% 0805	8	R114, R138, R174, R179, R187, R193, R214, R238
4720-473J-J	RMG 1/10W 47K 5% 0805	1	R183
4720-474J-J	RMG 1/10W 470K 5% 0805	2	R172, R185
4720-592A-J	RMG 1/10W 5.9K 1% 0805	2	R171, R184
4720-750J-J	RMG 1/10W 75R 5% 0805	1	R124
4720-752J-J	RMG 1/10W 7.5K 5% 0805	2	R108, R208
4720-821J-J	RMG 1/10W 820R 5% 0805	2	R111, R211
4721-101J-6	RMG 1/8W 100R 5% 1206	1	R197
4721-154J-6	RMG 1/8W 150K 5% 1206	6	R104, R173, R178, R186, R192, R204
4721-4643-6	RMG 1/8W 464K 1% 1206	3	R166, R167, R266
4721-473J-6	RMG 1/8W 47K 5% 1206	1	R125
4721-683A-6	RMG 1/8W 68K 1% 1206	4	R22A, R22B, R23A, R23B
4721-821J-6	RMG 1/8W 820R 5% 1206	4	R115, R130, R132, R215
4721-824J-6	RMG 1/8W 820K 5% 1206	2	R116, R216
4804-1480-3	DIODE LL4148 SM	18	D102–D106, D111–D116, D171, D173, D177, D202, D203, D205, D206
4853-9060-3	TR 3906 PNP SM	4	Q100, Q172, Q175, Q200
4860-0640-3	TR 3904 HFE 100-300 SM	4	Q101, Q102, Q171, Q173

PCB-QZ030C-PWR1 Channel 2 module (left)

QSC part #	Description	Qty.	Notes or Component Reference
153F-223J-5-LQ	CM 50V 0.022UF 5% RL	2	C216, C219
153F-332J-5-KW	CM 50V 3300pF 5% RL 6x12	2	C272, C279
153R-104J-5-YRM	CM 250V 0.1u 5% RL	2	C274, C275
153R-152J-5-XQ	CM 250V 0.0015UF 5% RL	1	C214
153R-683J-5-WWM	CM 250V 0.068u 5% RL	2	C224, C226
157E-107M-5-KW	CE 25V 100uF 20% RL 6x12	2	C273, C280
157E-226M-5-IUN	CE 25V 22uF 20% RL 5X11	1	C229
157F-476M-5-LU	CE 50V 47uF 20% RL	1	C8
157Q-106M-5-IU	CE 35V 10uF 20% RL 5x11	1	C271
157R-475M-5-OV	CE 250V 4.7u 20% RL	1	C7
1804-1040-0	SPRNG COIL 2uH(14gaWIRE)	1	L200
2102-031S-004	3 PIN ST. WAFER	1	J257
2102-130S-003	13 PIN WAFER P2.0 ST.	1	J204
3700-4531-G	LED 04mm GREEN W/STAND	1	LD1
4134-8851-0	FUSE HOLDER (DIA.6.3MM	2	REF: F200
4715-100J-2	RMF 1/4W 10R 5% AT	1	R263
4715-101J-2	RMF 1/4W 100R 5% AT	1	R264
4718-123J-2-X	RMF 1W 12K 5% AT METAL	2	R277, R294
4718-153J-2-X	RMF 1W 15K 5% AT METAL	1	R265
4718-220J-2-P	RMF 1W 22R 5% AT FP	2	R236, R237
4718-3R3J-1-X	RMF 1W 3.3R 5% AL	2	R246, R247
4719-1R5J-1-X	RMF 2W 1R5 5% AL METAL	2	R281, R282
4719-333J-2-X	RMF 2W 33K 5% AT METAL	2	R2, R5
4719-5R6J-1-X	RMF 2W 5.6R 5% AL METAL	1	R260
471A-022K-5-N	RMF 3W 0.22R 10% RL RGC3	8	R242, R243, R248, R249, R252, R253, R256, R259
471B-120J-1-X	RMF 5W 12R 5% AL METAL	4	R254, R255, R261, R262
471B-222J-1-X	RMF 5W 2.2K 5% AL METAL	3	R257, R258, R298
471B-512J-1-X	RMF 5W 5.1K 5% AL METAL	2	R280, R288
471B-822J-1-X	RMF 5W 8.2K 5% AL METAL	4	R218, R219, R233, R235
4756-1016-3-06	SVR H6 100R RH0615C	1	R231
4756-2226-3-06	SVR 2.2K H3 7X7.6 R0615C	2	R239, R240
4804-0040-1	DIODE IN4004 AL	5	D1, D11, D13, D217, D218
4804-9340-2	DIODE IN4934 AT	2	D208, D209
4837-3B20-2	DZ 1/2W 3.8-4.0V AT	1	D270
4837-5B10-2	DZ 1/2W 5.5-5.8V AT	2	D207, D210
4838-10V6-2	DZ 1.3W 10V AT TEMIC	1	D274
4838-12V6-2	DZ 1W 12V AT TEMIC	1	D278
4838-15V6-2	DZ 1W 15V AT TEMIC	2	D8, D15
4840-2190-0	DIODE MUR1520 15A 200V	2	D275, D276

Channel 2 module (continued)

QSC part #	Description	Qty.	Notes or Component Reference
4860-5020-5	TR MJE15032	1	Q205
4860-5030-5	TR MJE15033	1	Q206
4860-5050-5	TR 2SC5200 T0-3P (L)	4	Q204, Q208, Q210, Q212
4860-5060-5	TR 2SA1943 T0-3P (L)	4	Q203, Q207, Q209, Q211
4860-5250-5	TR 2N5064 TRIODE	2	D219, D220
4860-8890-0	TR MPS A06 VCE 80V NS	1	Q5
490F-Z440-5	FET IRFZ44 TO-220 60V	2	Q270, Q274
5120-0501-0	FUSE T25A/125V 6.4X32MM	1	F200
8910-0274-0	THERMAL PTC 60C 100 ohm	1	R7
8910-0482-0	TRIAC 600V 40A MAC224A8	1	Q213
8910-0488-0	ROD THERMISTOR NTC 50ohm	1	R234
8910-0494-0	CE 63V 12000uF 20% RL	4	C220–C223
Channel 2 SMT Parts			
150F-101K-J-BD	CC 50V 100P 10% 0805	1	C9
150F-103M-J-BD	CC 50V 0.01uF 20% 0805 1	1	C281
150F-104M-6-CF	CC 50V 0.1uF 20% 1206 1.	1	C278
150F-104M-J-BD	CC 50V 0.1uF 20% 0805 1.	1	C11
150F-222K-6-CF	CC 50V 2200pF 10% 1206 1	1	C215
150F-470J-J-BD	CC 50V 47pF 5% 0805 1.2x	3	C270, C276, C277
3130-9240-0	IC LM311M VOLTAGE	2	U270, U271
4720-103J-J	RMG 1/10W 10K 5% 0805	1	R228
4720-123J-J	RMG 1/10W 12K 5% 0805	1	R276
4720-152J-J	RMG 1/10W 1.5K 5% 0805	1	R229
4720-202J-J	RMG 1/10W 2K 5% 0805	3	R8, R290, R295
4720-222J-J	RMG 1/10W 2.2K 5% 0805	1	R291
4720-3011-J	RMG 1/10W 3.01K 1% 0805	1	R275
4720-470J-J	RMG 1/10W 47R 5% 0805	3	R25, R270, R289
4720-472J-J	RMG 1/10W 4.7K 5% 0805	4	R274, R279, R287, R293
4720-473J-J	RMG 1/10W 47K 5% 0805	1	R283
4720-474J-J	RMG 1/10W 470K 5% 0805	2	R272, R285
4720-592A-J	RMG 1/10W 5.9K 1% 0805	2	R271, R284
4720-750J-J	RMG 1/10W 75R 5% 0805	1	R224
4721-101J-6	RMG 1/8W 100R 5% 1206	1	R30
4721-105J-6	RMG 1/8W 1M 5% 1206	2	R3, R6
4721-154J-6	RMG 1/8W 150K 5% 1206	5	R10, R273, R278, R286, R292
4721-224J-6	RMG 1/8W 220K 5% 1206	2	R18, R26
4721-334J-6	RMG 1/8W 330K 5% 1206	1	R27
4721-4643-6	RMG 1/8W 464K 1% 1206	1	R15
4721-473J-6	RMG 1/8W 47K 5% 1206	1	R225
4721-682J-6	RMG 1/8W 6.8K 5% 1206	1	R19
4721-821J-6	RMG 1/8W 820R 5% 1206	2	R230, R232
4804-1480-3	DIODE LL4148 SM	18	D2–D7, D9, D14, D204, D211–D216, D271, D273, D277
4853-9060-3	TR 3906 PNP SM	5	Q4, Q6, Q7, Q272, Q275
4860-0640-3	TR 3904 HFE 100-300 SM	6	Q8, Q9, Q201, Q202, Q271, Q273
4860-5110-3	TR KST42	1	Q1

PCB-QZ030C-INP Input Board

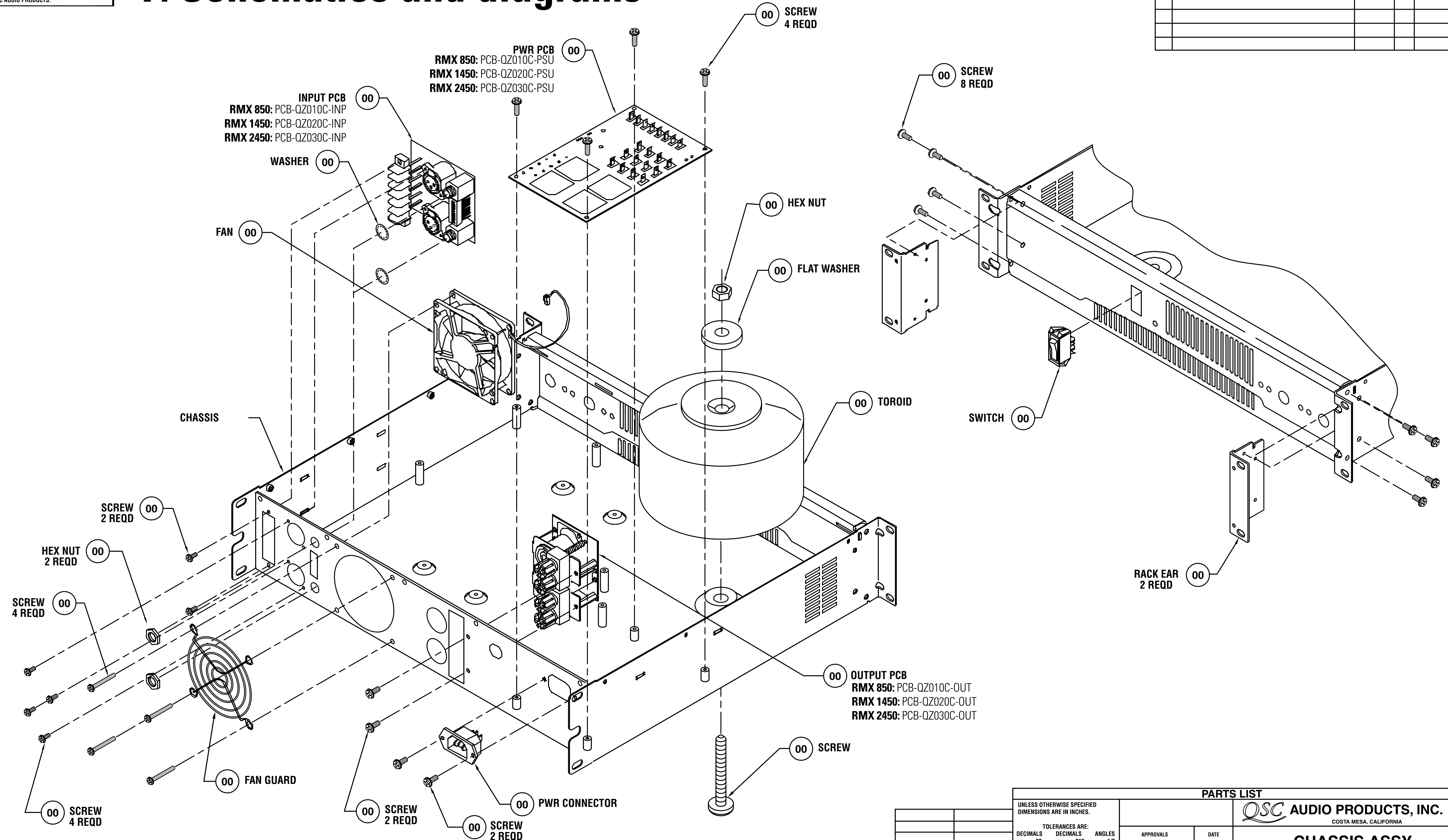
150F-471J-5-OF	CC 50V 470pF 5% RL 8x3.5	4	C1, C2, C3, C4
2113-1337-1	XLR FEMALE CONN.	2	J101, J201
2113-1652-0	PHONE JACK 1/4" 6.4 mm	2	J102, J202
5200-4713-0	10 POLE DIP SWITCH	1	SW1
7010-9860-0	26 PIN IEC RIBBON CABLE	1	J1

PCB-QZ030C-OUT Output Board

2113-1336-1	SPEAKON NEUTRIK 4 WIRE	2	J100, J200
2113-1338-0	4-POLE SPEAKER TERMINAL	1	J103
4154-2111-0	OUTPUT POST PLUG FOR CE	2	For European models only
4154-2121-0	OUTPUT POST PLUG FOR CE	2	For European models only

7. Schematics and diagrams

REVISIONS				
REV	DESCRIPTION	EFF DATE	CHK	APPROVED DATE
A	XX			



THIS DRAWING USED IN CONJUNCTION WITH SCHEMATIC DWGs MAIN PCB SH-002451,
INPUT PCB XO,
WIRING DIAGRAM SH-002450-00 AND FINAL ASSY PF-002450-00.

NOTES: UNLESS OTHERWISE SPECIFIED

7.1 RMX Assembly/Disassembly Diagram 1 of 2

(All models)

X	RMX 2450	
NEXT ASSY	USED ON	
APPLICATION		

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
TOLERANCES ARE: DECIMALS .XX ± .02 DECIMALS .XXX ± .010 ANGLES ±1/2
DEBURR EDGES .XXX R MAX
MATERIAL: SEE TABULATION BLOCK
FINISH
DO NOT SCALE DRAWING

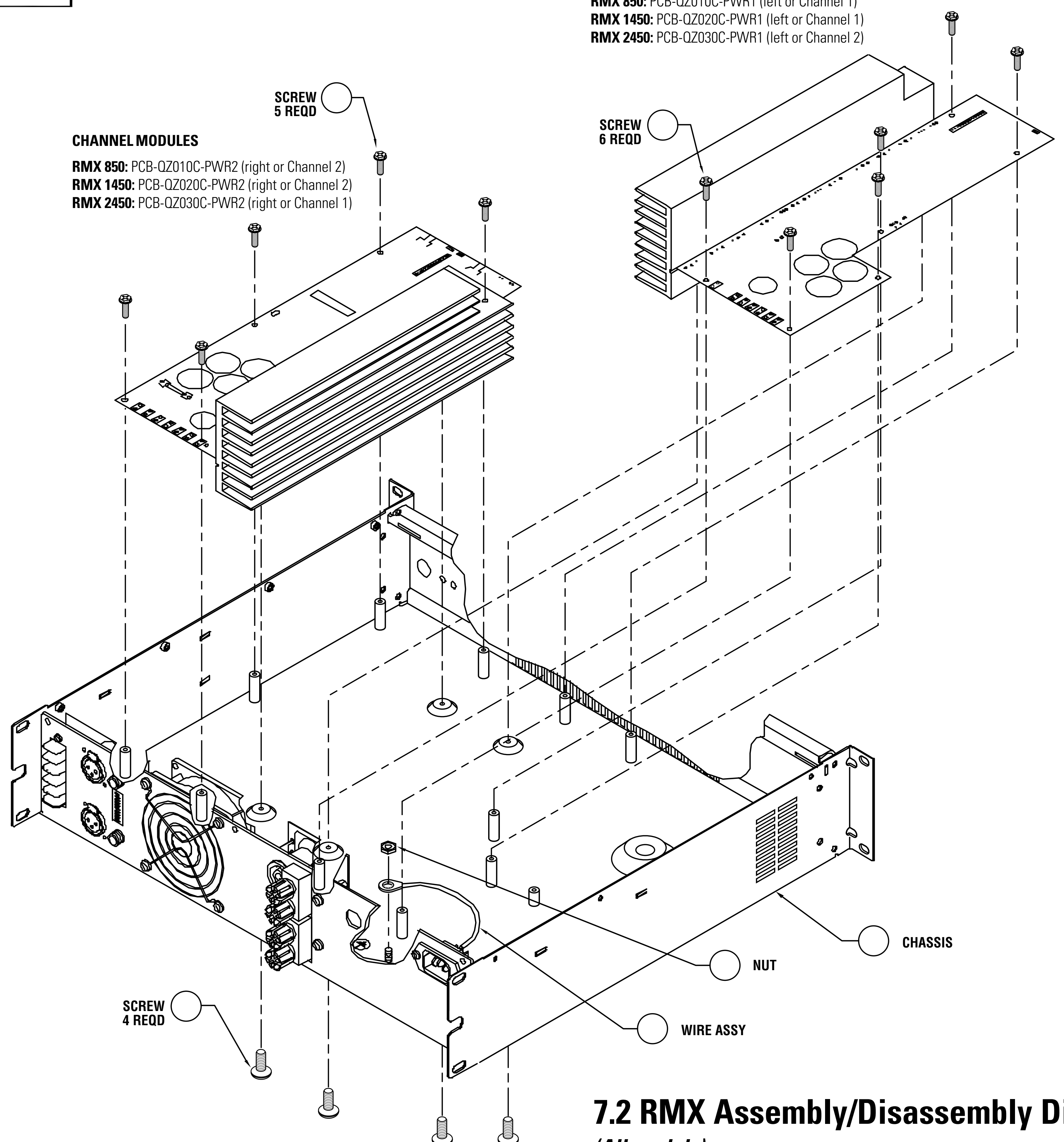
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DRAWN	MILA P.	12-07-2000
CHECKED		
ISSUED		

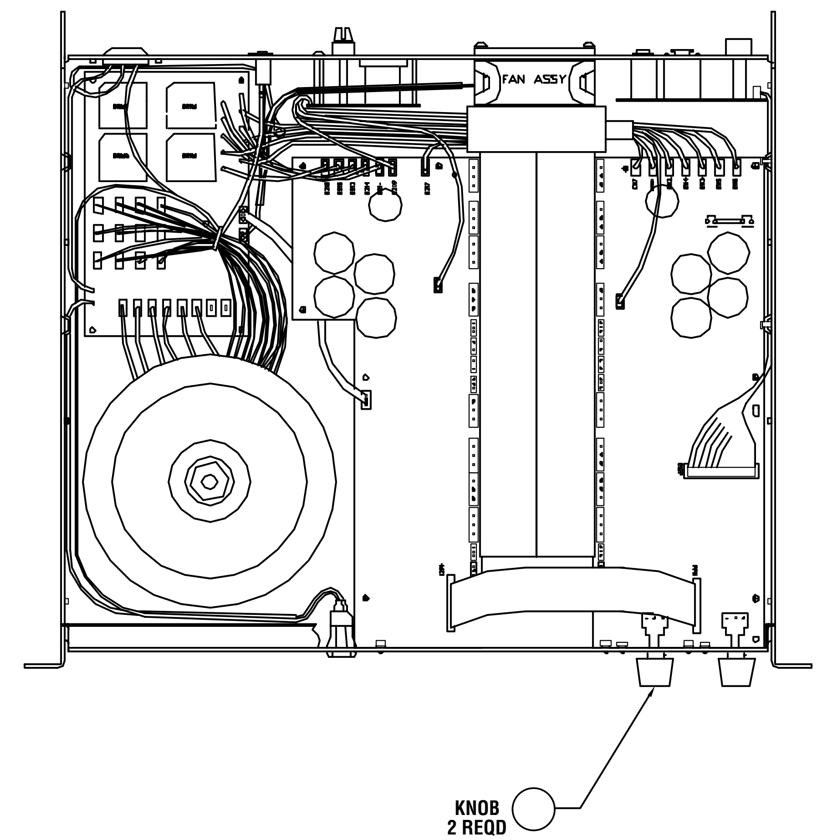
QSC AUDIO PRODUCTS, INC.
COSTA MESA, CALIFORNIA

CHASSIS ASSY
RMX 2450

SIZE D | DWG NO. PA-002450-00 | REV
SCALE 1/2 | SHEET 1 OF 2

DWG NO. PA-002450-00 SH 1 REV



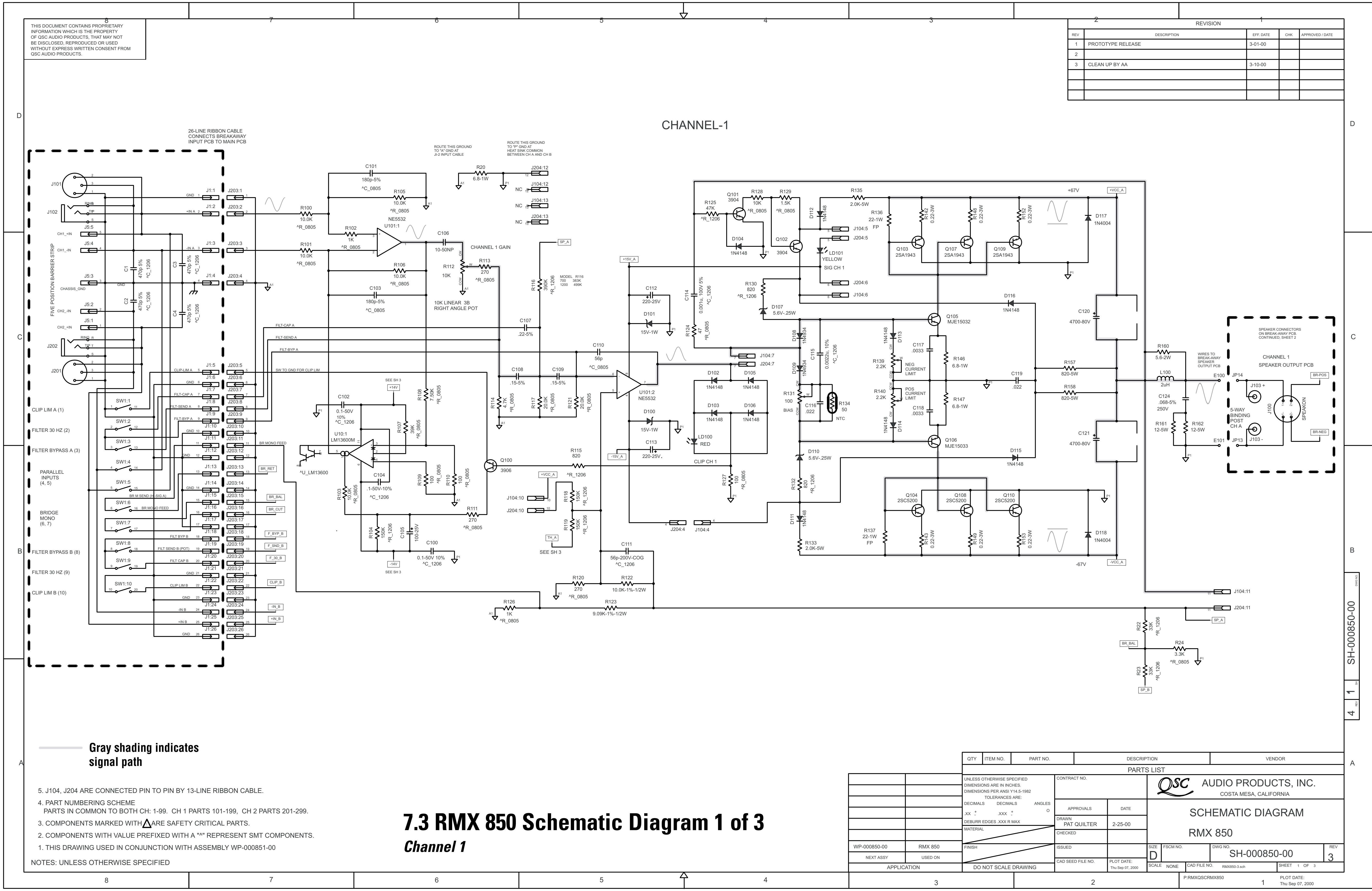


7.2 RMX Assembly/Disassembly Diagram 2 of 2

(All models)

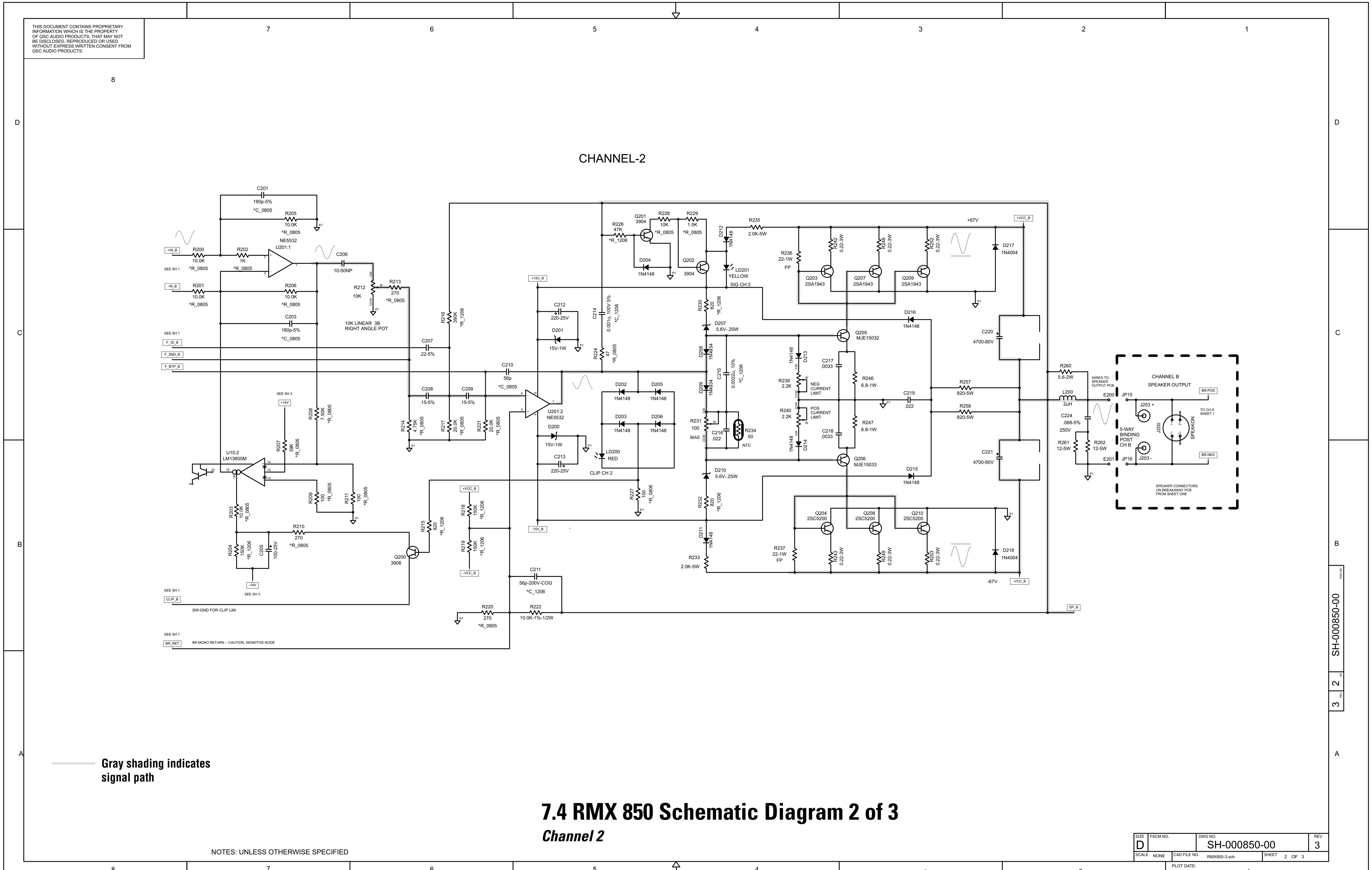
D	DWG NO. PA-002450-00	REV
SCALE 1/2	SHEET 2 OF 2	

DWG NO. PA-002450-00 SH 2 REV



7.3 RMX 850 Schematic Diagram 1 of 3

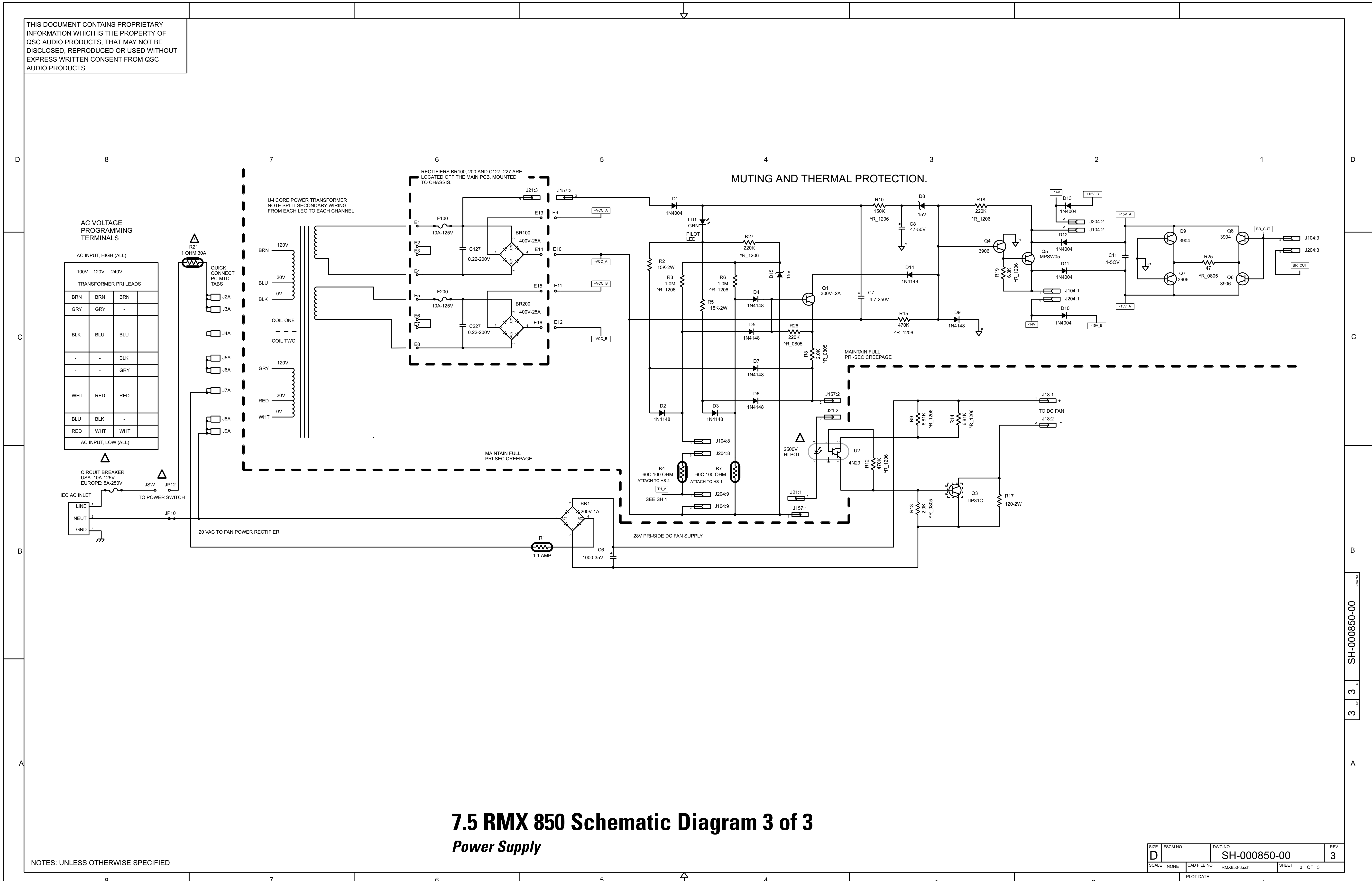
Channel 1



Gray shading indicates signal path

7.4 RMX 850 Schematic Diagram 2 of 3

Channel 2

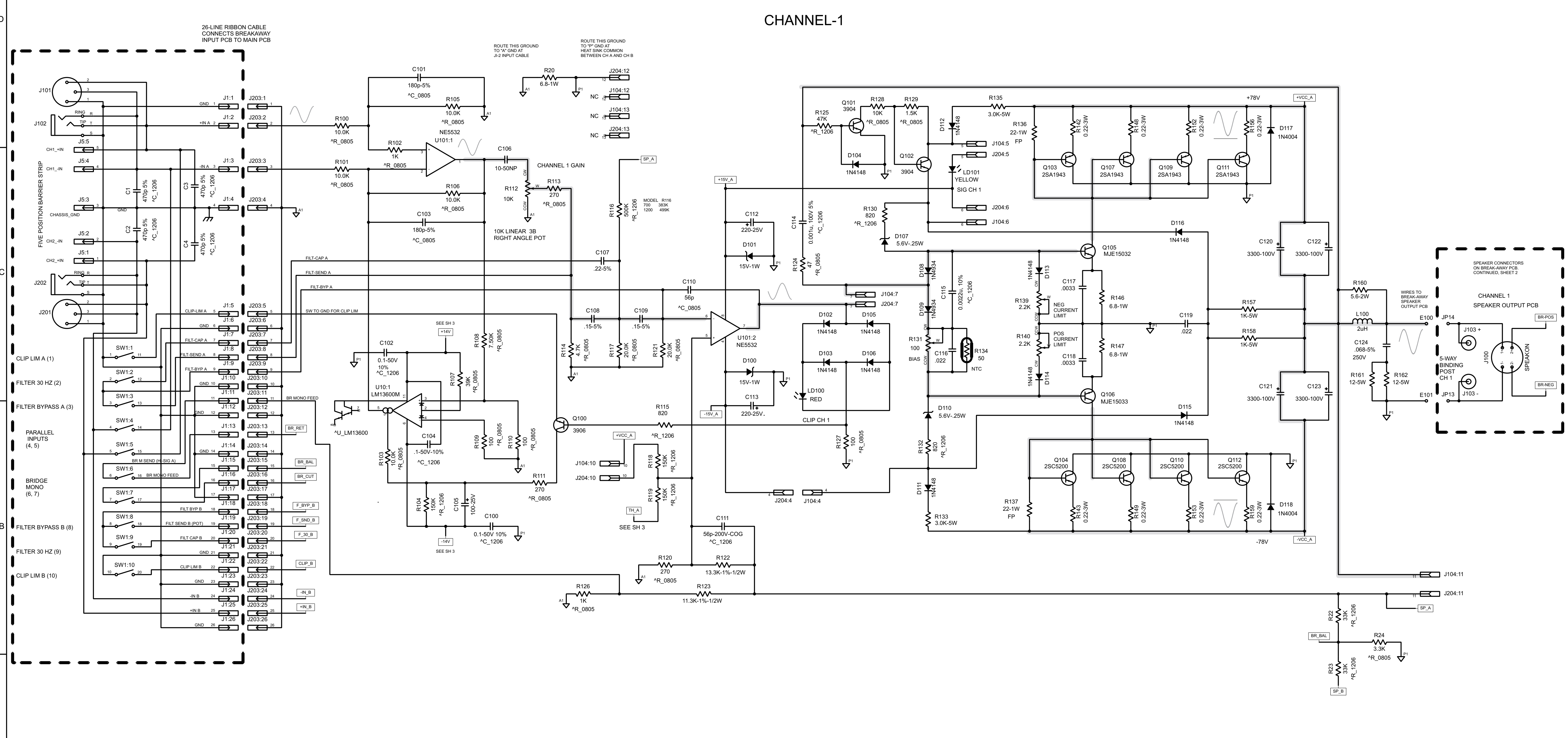


7.5 RMX 850 Schematic Diagram 3 of 3

Power Supply

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REVISION				
REV	DESCRIPTION	EFF. DATE	CHK	APPROVED / DATE
1	PROTOTYPE RELEASE	3-01-00		
2	CLEAN UP BY PHQ	3-02-00		
3				
4	CLEAN UP BY AA	3-10-00		



Gray shading indicates signal path

5. J104, J204 ARE CONNECTED PIN TO PIN BY 13-LINE RIBBON CABLE.

4. PART NUMBERING SCHEME
PARTS IN COMMON TO BOTH CH: 1-99. CH 1 PARTS 101-199, CH 2 PARTS 201-299.

3. COMPONENTS MARKED WITH △ ARE SAFETY CRITICAL PARTS.

2. COMPONENTS WITH VALUE PREFIXED WITH A "^" REPRESENT SMT COMPONENTS.

1. THIS DRAWING USED IN CONJUNCTION WITH ASSEMBLY WP-001451-00

NOTES: UNLESS OTHERWISE SPECIFIED

7.6 RMX 1450 Schematic Diagram 1 of 3

Channel 1

QTY	ITEM NO.	PART NO.	DESCRIPTION	VENDOR

PARTS LIST

NEXT ASSY	USED ON
WP-001451-00	RMX 1450

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. DIMENSIONS PER ANSI Y14.5-1982
TOLERANCES ARE: DECIMALS .XX ± DECIMALS .XXX ± ANGLES ±
DEBURR EDGES .XXX R MAX
MATERIAL
FINISH
DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN PAT QUILTER	2-25-00
CHECKED	
ISSUED	

CAD SEED FILE NO. PLOT DATE: Thu Sep 07, 2000

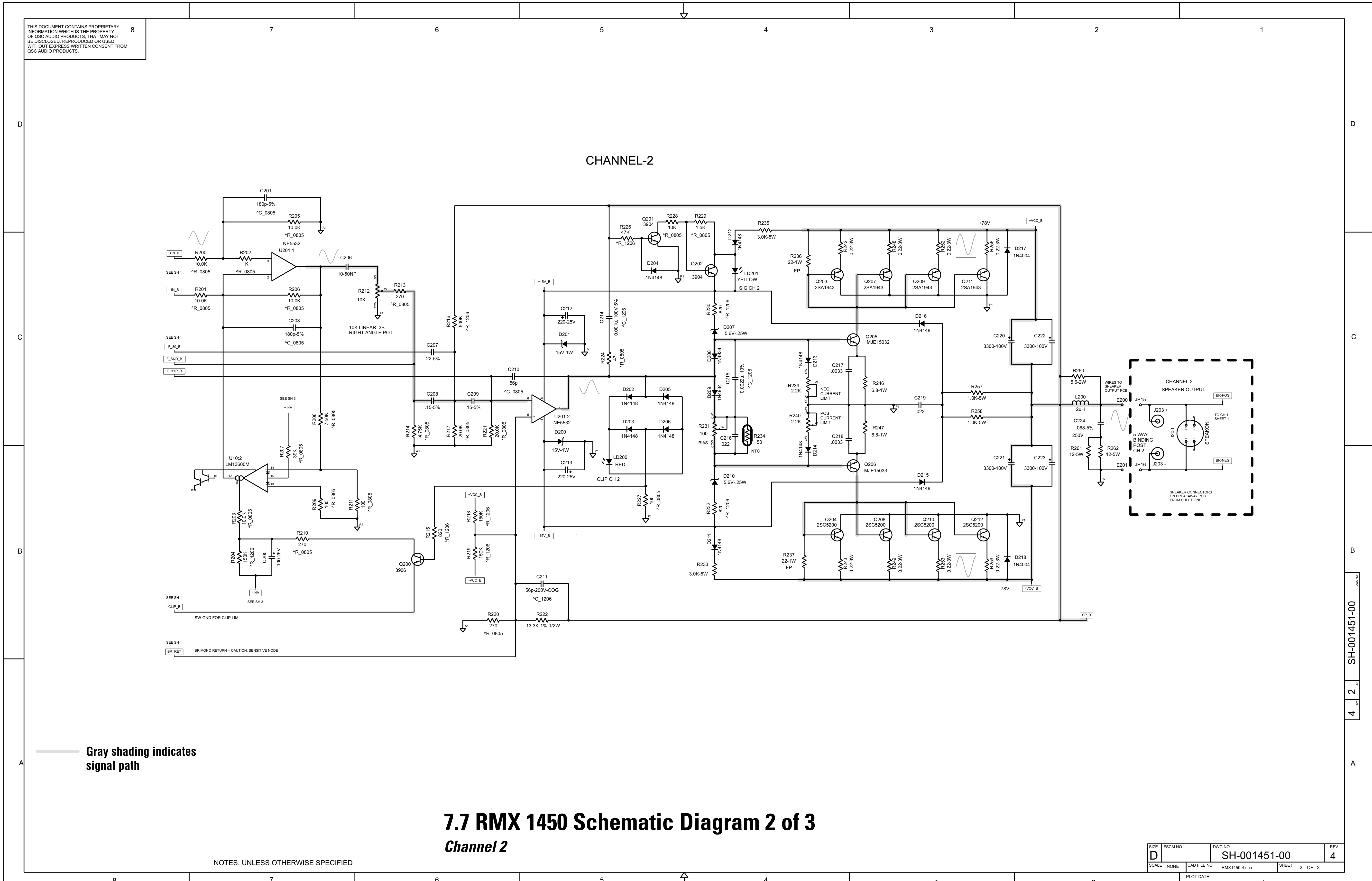
QSC AUDIO PRODUCTS, INC.
COSTA MESA, CALIFORNIA

SCHEMATIC DIAGRAM
RMX 1450

SIZE D FSCM NO. DWG NO. SH-001451-00 REV 4
SCALE NONE CAD FILE NO. RMX1450-4.sch SHEET 1 OF 3
P:\PE\PRODUCTS\PRMX-SERIES\QSC145 0
PLOT DATE: Thu Sep 07, 2000

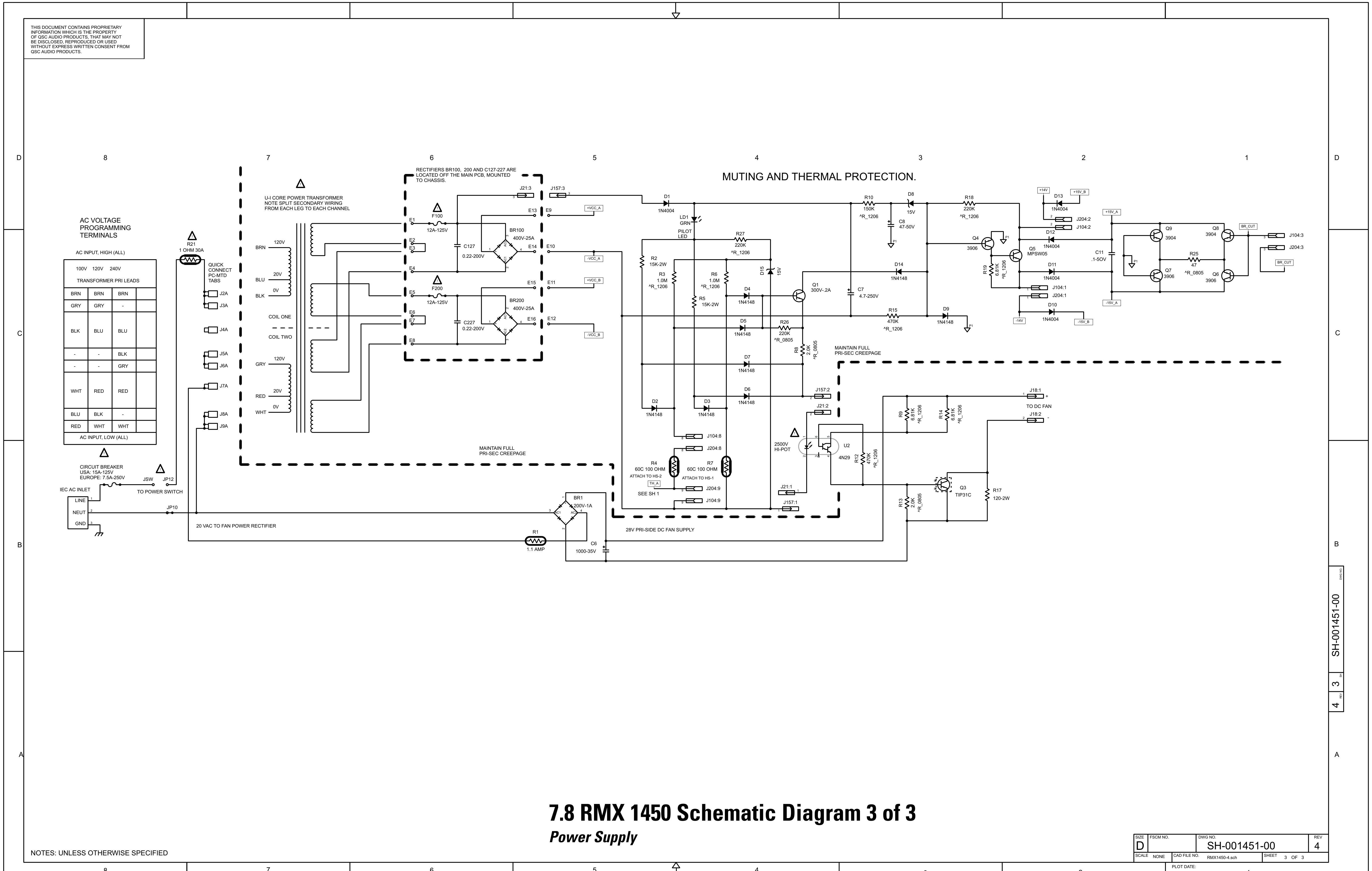
7.7 RMX 1450 Schematic Diagram 2 of 3

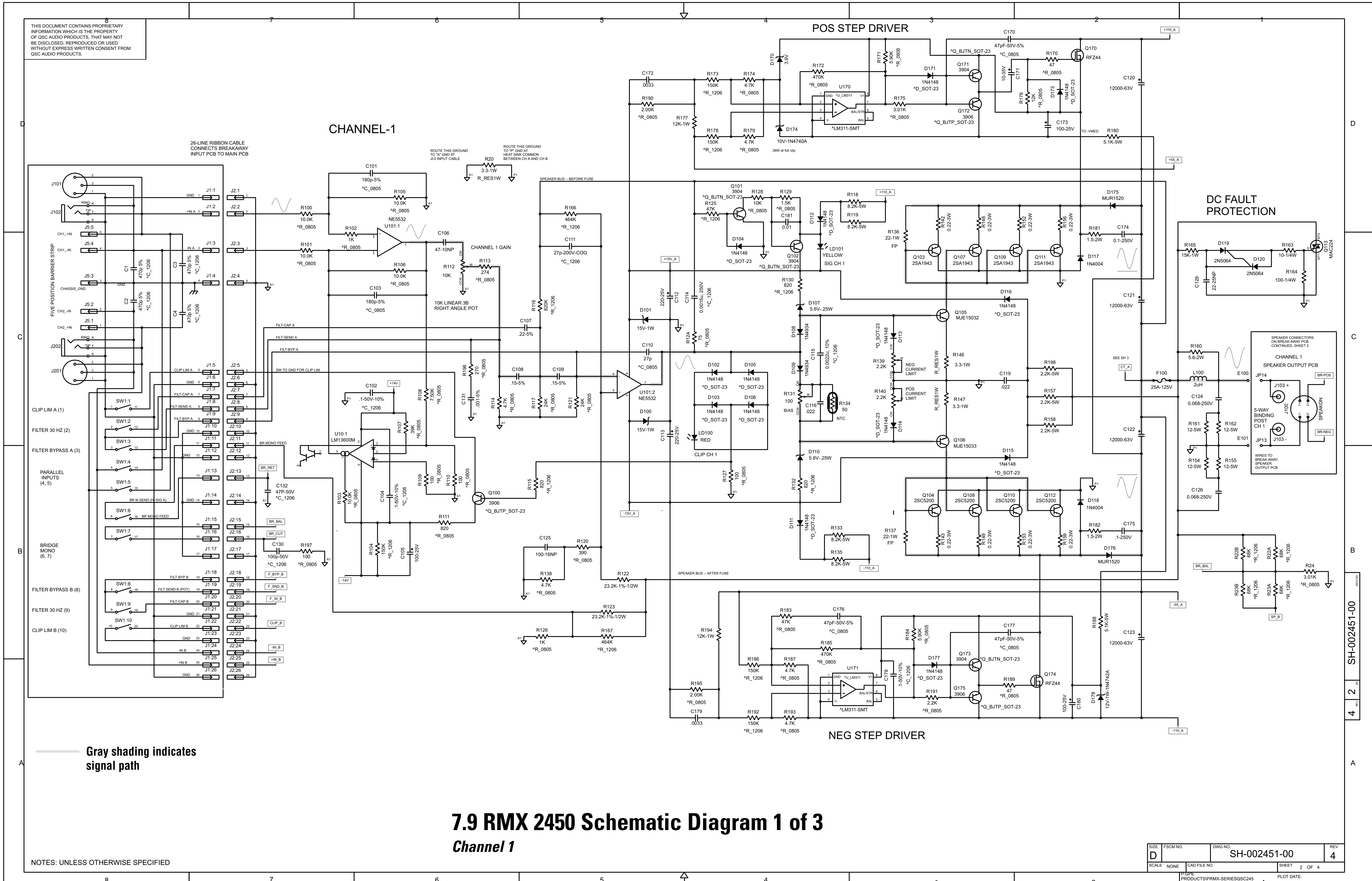
Channel 2



7.8 RMX 1450 Schematic Diagram 3 of 3

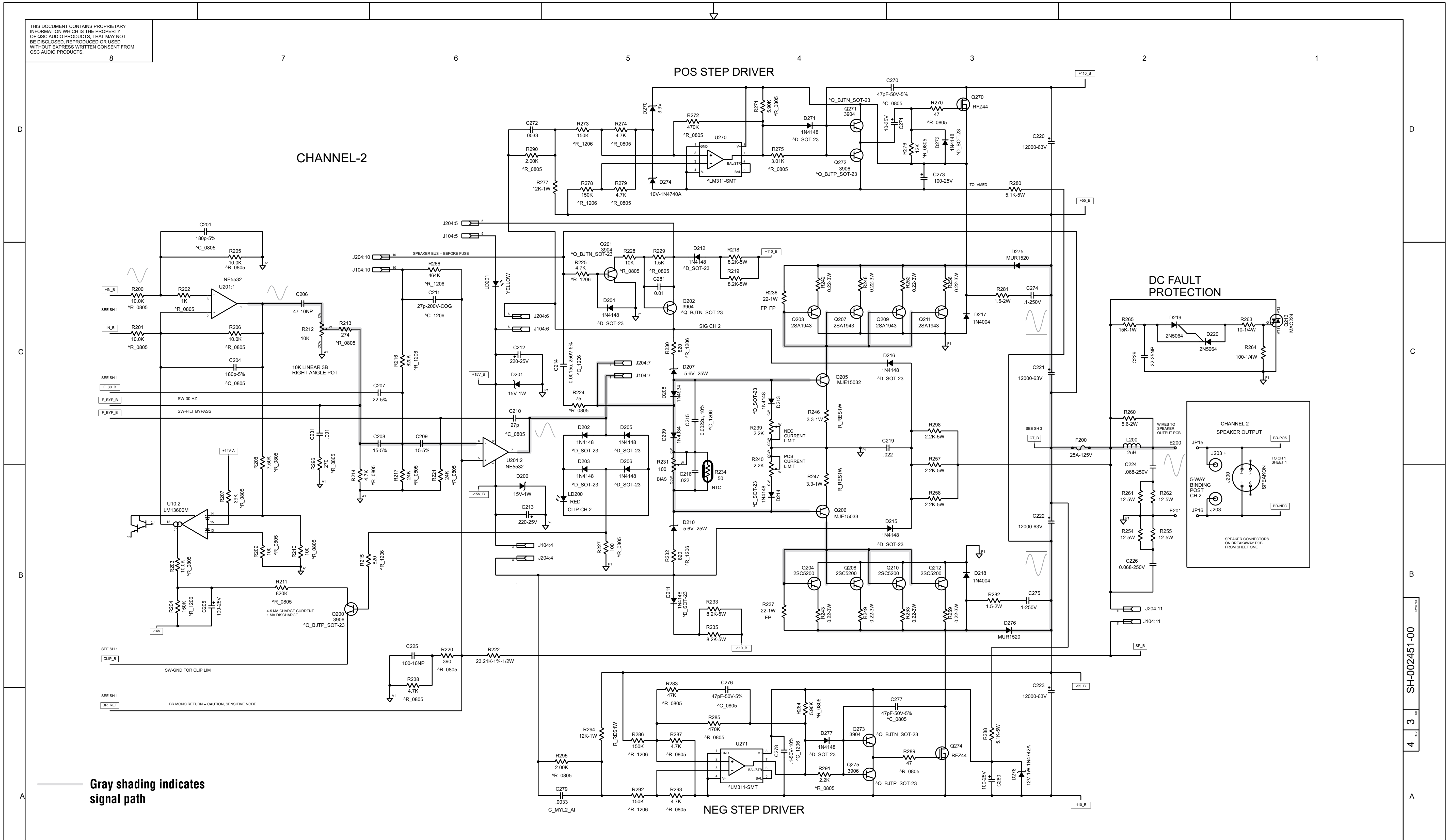
Power Supply





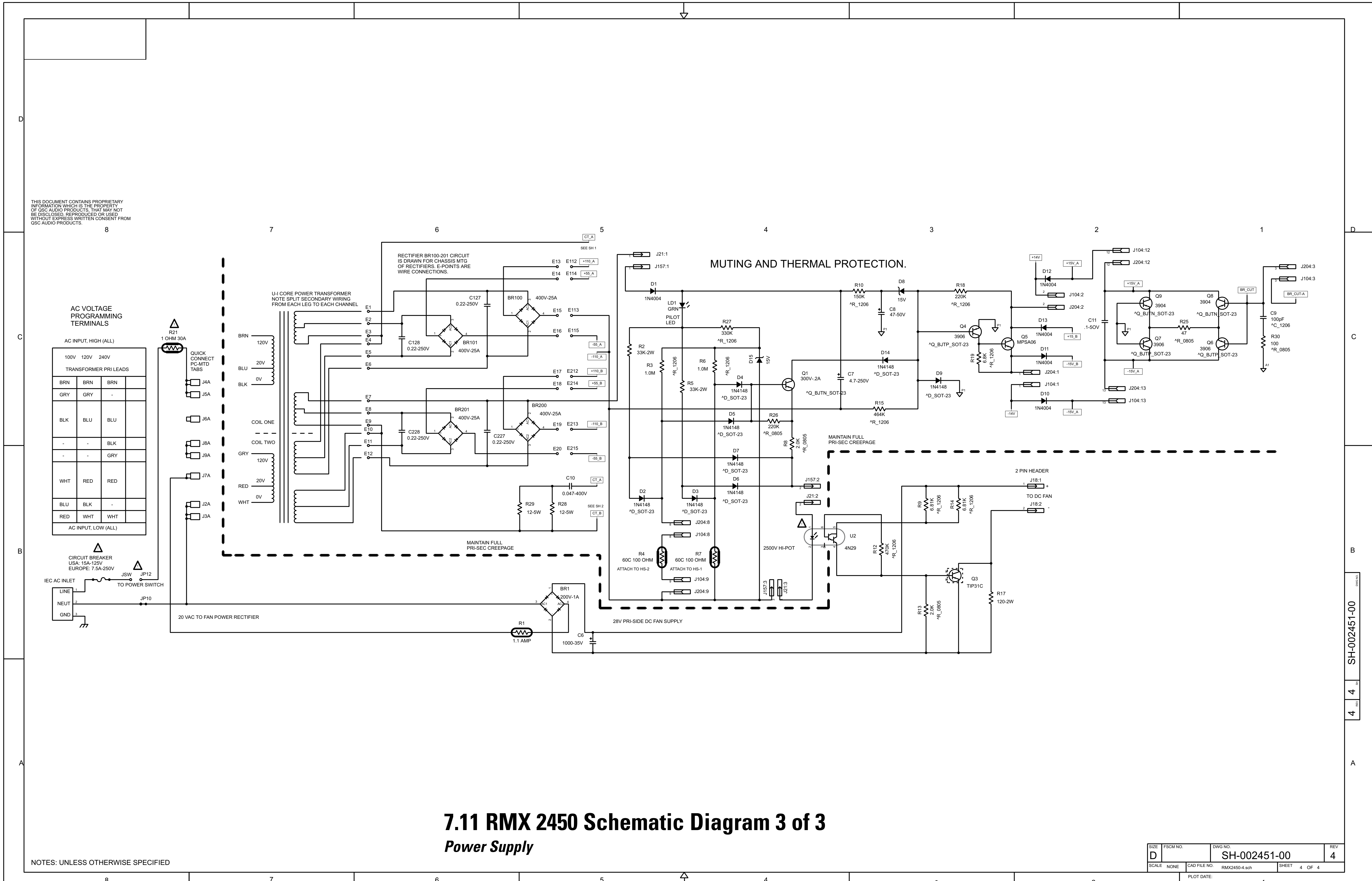
7.9 RMX 2450 Schematic Diagram 1 of 3

Channel 1



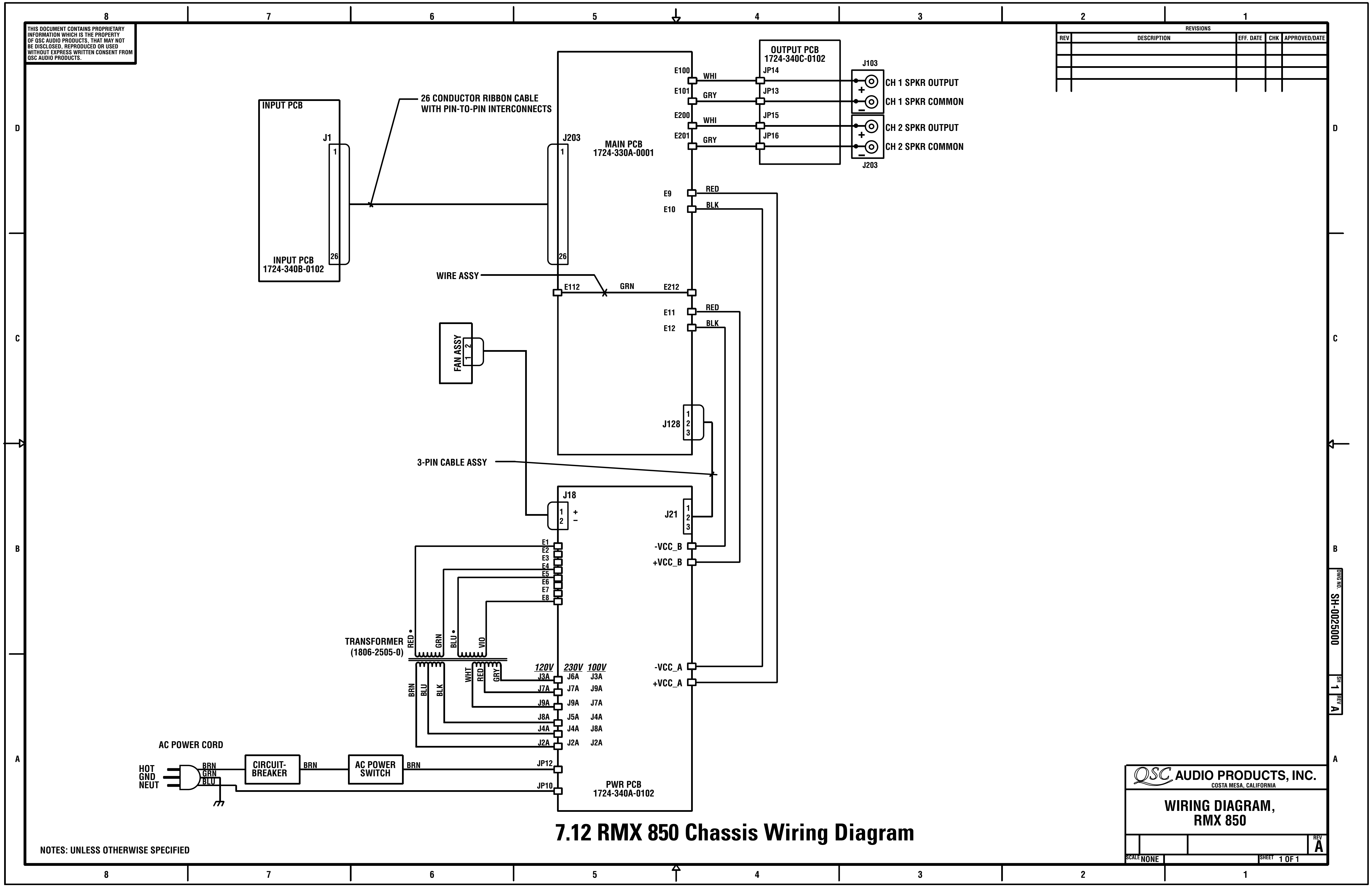
7.10 RMX 2450 Schematic Diagram 2 of 3

Channel 2



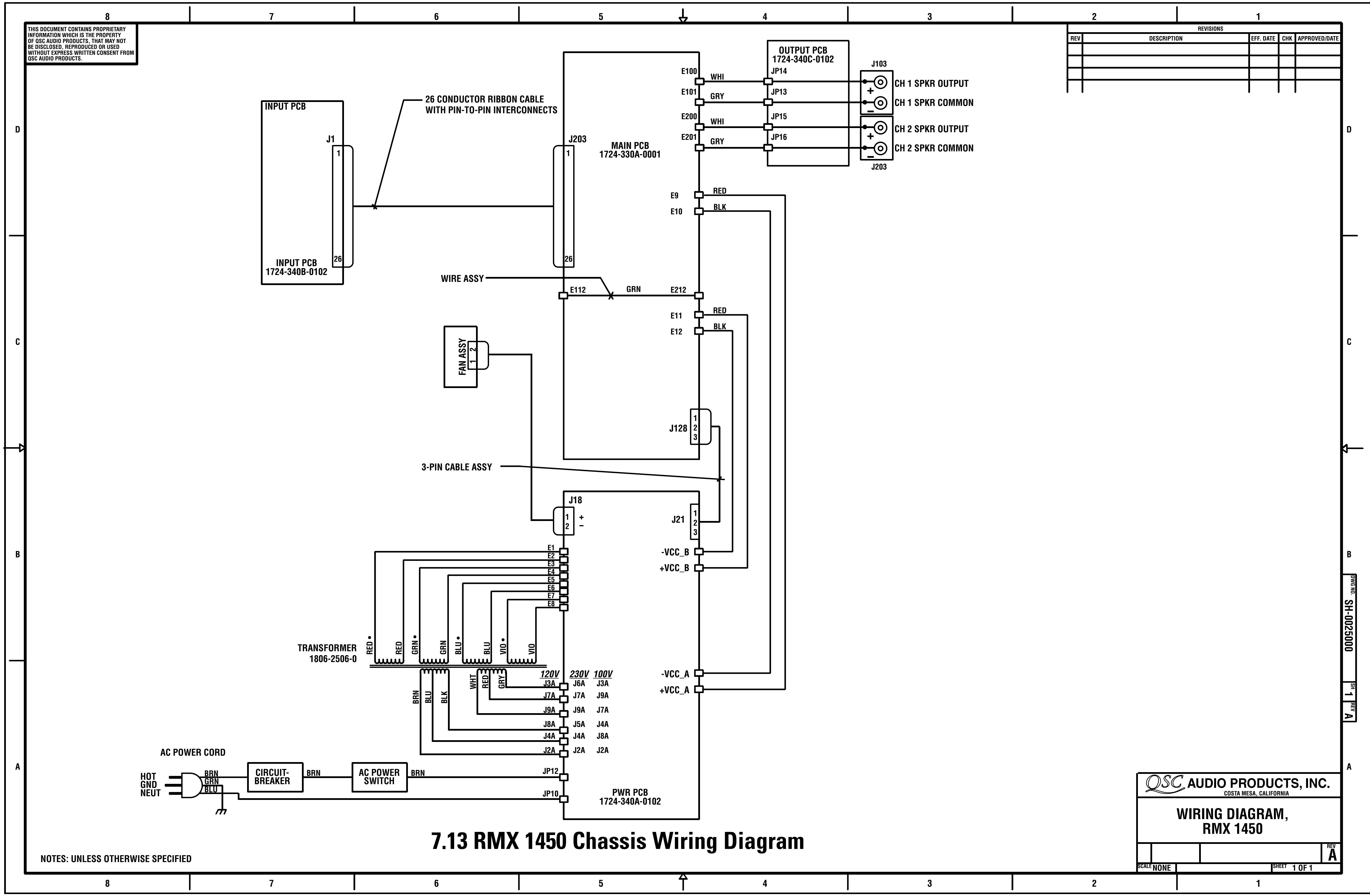
7.11 RMX 2450 Schematic Diagram 3 of 3

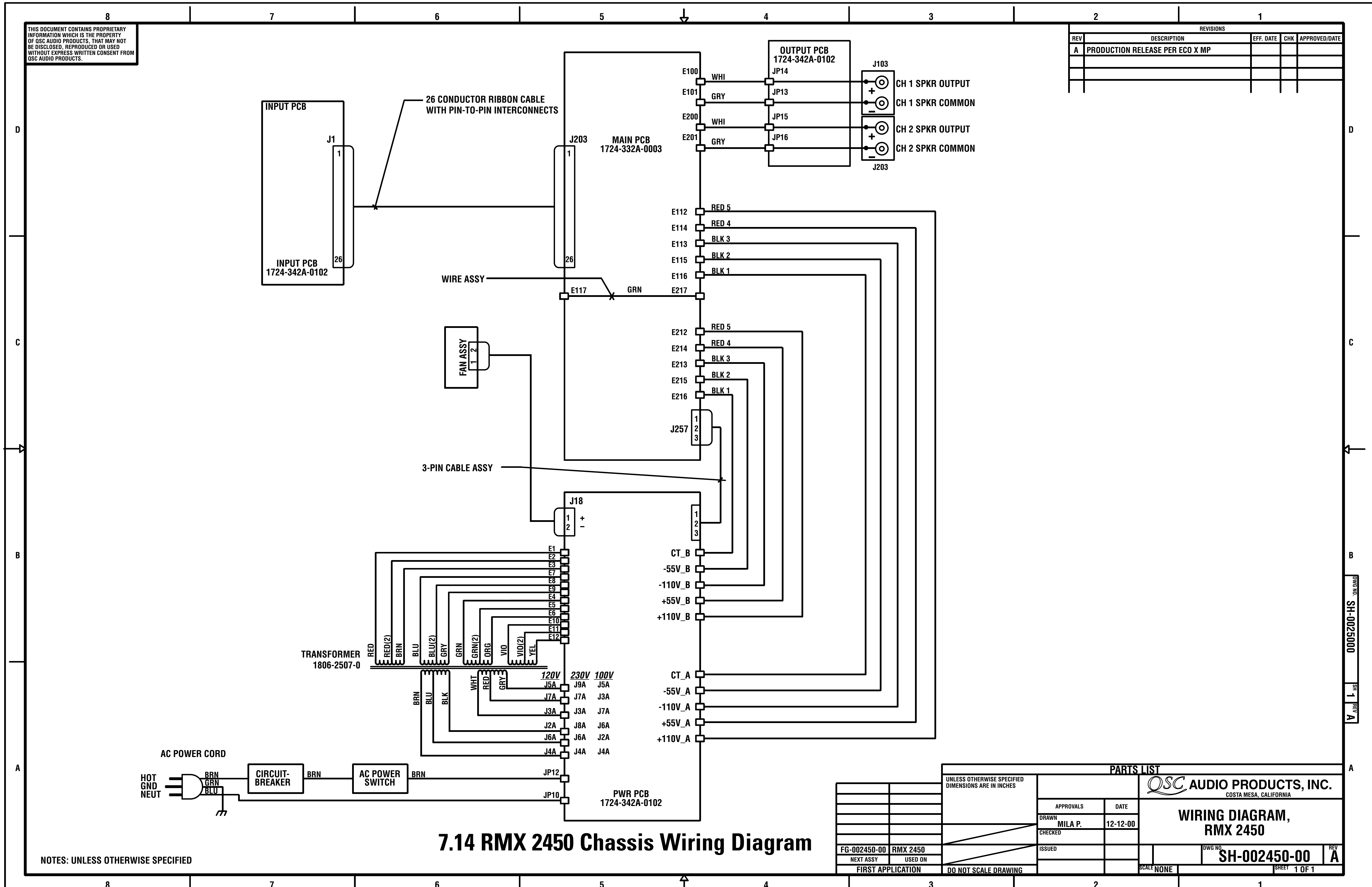
Power Supply



7.12 RMX 850 Chassis Wiring Diagram

7.13 RMX 1450 Chassis Wiring Diagram





7.14 RMX 2450 Chassis Wiring Diagram

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